A
REPLY
TO
Mr. *WILSON*'s ANSWER
TO MY
LETTER to *Dr.* HALLEY.

CONTAINING

An *Anſwer* to his *Challenge*;

With a farther *Vindication* of the *Mercator*'s-*Chart*, againſt his falſe *Inſinuations* and *Aſperſions*. A Demonſtration of the *Falſity* of his *bluſtering* Title-Page: And, an Offer to the ſaid *Wilſon* to meet him before the *ROYAL-SOCIETY*, in order fairly to try with Him, in the Preſence of that *Illuſtrious Body*, by Way of EXPERIMENT, which is the *moſt Excellent Invention*, the *Mercator*'s, or the *Globular-Chart*.

Where, by another EXPERIMENT,
I propoſe to prove (if he will not fail to meet me) that the *Globular Projection* muſt neceſſarily in many Caſes deceive the Induſtrious MARINER, *Twenty* in *Forty*, if meaſured by one and the ſame *Scale* of *Equal-Parts*, according to his PROPOSALS.

To which is prefixed,

A *Second Letter to Dr*. Halley.

By *THOMAS HASELDEN*, *late Teacher of the* MATHEMATICKS *to His Majeſty*'s *Volunteers* in the *Royal Navy*.

LONDON: Printed for the AUTHOR.

BRITISH MUSEUM

To the CELEBRATED

Dr. EDMUND HALLEY,

Regius Profeſſor of *Aſtronomy*, &c.

SIR,

I HAVE *ſeen what is called an Anſwer to the Letter I did myſelf the Honour to write to you; yet, for all I can find to the contrary in the ſaid Anſwer, I muſt ſtill beg Leave to be of Opinion, that you, who are placed in ſo high a Station, and whoſe Buſineſs is to cultivate and improve the Nautical as well as Aſtronomical Science (as the Inſcription upon the out-ſide of the Obſervatory informs us) cannot have any real Deſign to incourage a Thing in the common Practice of Navigation, in Oppoſition to ſo excellent an Invention as all the World allows the* Mercator's-Chart *really is, and which you yourſelf muſt know can never anſwer the Principal End of* Charts.

I AM *the more confirmed in this Opinion from the Certificate you firſt gave them to recommend this Invention to the World, where you repreſent it as* a Chart *that may be uſeful to thoſe who are minded to ſail by the Arch of a great Circle. But certainly, Sir, you who have had* *ſufficient Experience, know this cannot be done, except it be under a Meridian and the Equator, till Mankind ſhall find out ſome other Sort of a Contrivance than the Compaſs, to guide and direct them from Place to Place.*

AND *therefore to repreſent to you and to the World, that theſe People had made an ill Uſe of your Favours, that they had exceeded the Bounds of your Recommendation; nay, that they had abuſed it ſo far, as to make the World believe the* Mercator's-Chart *was Puzzling, Difficult, and Abſurd,* * *and that* Great Circle Sailing *may by that* Chart *be render'd as eaſy as* Plain-Sailing: *And laſtly, that theſe and other Things of like Nature (the contrary of which every one who has but dipt into the Art of Navigation knows to be true) had obtained your Patronage and Protection. I ſay, to repreſent to you and to the World, that they had made Uſe of your Great Name to impoſe upon the ignorant Part of Mankind, would, in my Opinion, have been ſo far from being unacceptable to you, that it would have been taken kindly at the Hands of any Perſon that ſhould have undertaken to have done it, in order to free you from the Imputation of encouraging a Thing which every diſintereſted Perſon I have converſ'd with, or can hear of, knows can never anſwer the End propoſed.*

UPON *this Account it was, I could not forbear thinking, that it was through their great Importunity,* &c. *that you condeſcended to grant them ſuch a Certificate.*

Mr. WILSON *indeed, taxes me with Inconſiſtency, and the Reaſon he gives for it is, becauſe while I inſinuate that your good Nature was prevailed upon by ſome extraordinary Method, ſuch as Importunity,* &c. *to grant the Certificate, at the ſame time I gave you the higheſt Encomiums. I muſt confeſs,* Sir, *I did ſo; nor have I yet found ſufficient Cauſe to alter my Opinion; for in the ſaid Certificate, you are*

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* See their *Advertiſement* in the *Poſt-Boy*, from *July* the 28th to *July* the 30th 1719, which is tranſcribed in the following *Reply*, Page 14.

for

pleaſed to ſay indeed, that the Globular-Chart MAY be of Good Uſe to Navigators; *but you do not tell the World that it will be of* Better *Uſe than* Mercator*'s. Now, not to ſay this, is to ſay nothing to the Purpoſe (for there can be no Reaſon to lay by an old Invention for a New, unleſs the New be better than the Old) and is no Recommendation at all, but is mere trifling, which no Man ſhall perſuade me that the celebrated Dr.* Halley *would have been guilty of, without being compell'd to it by ſome extraordinary Method, ſuch as Importunity,* &c.

IN *the next Place, your Certificate mentions, that the* Globular-Chart *may be of good Uſe*; particularly to thoſe who would ſail by the Arch of a Great Circle. *I humbly conceive you don't here intend that the* Globular-Chart *can ſhew us what continual and momentaneous Alterations of Courſe a Ship muſt undergo to keep herſelf upon the Arch of a great Circle. Could it ſhew this indeed, all Mankind would then readily acknowledge it to be a wonderful Invention; but this I have no Reaſon to believe is your Meaning. I humbly preſume then it muſt be upon Suppoſition, that the Arch of a great Circle is repreſented by a Right Line in this* Chart, *that you recommend it to thoſe only who would ſail by the Arch of a great Circle. I muſt confeſs, if the Arch of a great Circle were repeſented in this* Chart *by a Right Line, then it might be of ſome kind of Service to thoſe who would ſail by the Arch of a great Circle, becauſe by pricking off the Place of the Ship by help of her known Latitude and Longitude, one might diſcover whether ſhe were on the Arch or not; and if ſhe were off, ſhape a proper Courſe to bring her on again. But ſince the Arch of a great Circle is not repreſented in this* Chart *by a right Line, (for if it were, then all the Meridians would be right Lines, which we find are not) but by a Curve; and ſince there may be drawn, and with as little Trouble too, a Curve in the* Mercator's-Chart *which ſhall repreſent the Arch of a great Circle; therefore the* Globular-Chart *can be of no more Uſe in* Circular-Sailing *than* Mercator*'s; and conſequently, a Gentleman of your Underſtanding, could not have been prevailed upon to recommend it* *it particularly for* Circular Sailing, *without being prevailed upon ſo to do by ſome extraordinarry Method, ſuch as Importunity,* &c.

It *is now about twenty Years ſince, as I have been informed, that there was an Inſtrument invented for facilitating or rendering ſailing by the Arch of a great Circle practicable, and a* Propoſal *laid before the Parliament for an* Act, *That no other Sort of Sailing ſhould be uſed; but tho' this Inſtrument was better adapted to the Purpoſe than the* Globular-Chart, *yet the ſaid Propoſal was thrown out upon the Repreſentation of a Gentleman who then ſat in the Houſe, whoſe Name is too great to be mentioned here. This, Sir, you may remember, therefore I am perſuaded you would not have recommended the Uſe of Great Circle Sailing again to the World, without being prevailed upon ſo to do by ſome extraordinary Method, ſuch as Importunity,* &c.

Lastly, *If we conſider the two* Charts, *with reſpect to the Simplicity of their Conſtruction, what Projection can be more eaſy than that which conſiſts wholly of right Lines? And then as to the Uſe, being the Courſe and Diſtance between Port and Port (the principal Thing for which* Charts *are made) may be found upon the* Mercator's-Chart *by a right Line and a Circle; and ſince this muſt be done on the* Globular-Chart *by a Curve Line of the Infiniteſſimal Order, and by a Curvilineal Angle; to ſay this* Chart *may be as Uſeful and Eaſy, or more for the* Mariner's *Purpoſe than the* Mercator's Chart *is; to affirm that a Curve Line may be drawn, and any Portion of it meaſur'd, and a Curvilineal Angle conſtructed with equal if not greater Exactneſs, and in leſs Time than a right Line and the Arch of a Circle: This is ſuch a Propoſition which I am perſuaded the celebrated Savilian Profeſſor of* Geometry *himſelf will not undertake to aſſert, much leſs, to Explain and Prove. I am therefore ſtill more confirmed, that you could not have been prevailed upon to give them a Recommendatory Certificate to the* Globular-Chart, *but by ſome extraordinary Method, ſuch as Importunity,* &c.

And *ſuppoſing this to be the Caſe, I do not look upon it as any Fault, or the leaſt Blemiſh in the Character of a Great Man, when he* *he is preſſed to the laſt Degree by the Importunity of troubleſome or conceited Perſons, to comply with their Requeſts for the Sake of a Delivery. The Immortal* Horace, *I find, introduces himſelf in one of his* Books, *as reduced to the greateſt Extremity by one of thoſe Coxcombs, and at ſuch a Juncture, I doubt not, but he would have given the Fellow a Certificate that the Verb* Perſonal, *ought not to agree with the* Nominative Caſe *in* Number *and* Perſon, *could he have compounded for his Freedom at that Rate; nor would any Man have blamed him. I hope then it may be no Inconſiſtency, to beſtow the greateſt Epithets on a* Gentleman, *and yet, at the ſame time, to ſuppoſe him prevailed upon by ſome extraordinary Method, ſuch as Importunity,* &c.

In *the* Philoſophical Tranſactions, N° 370, *for the Months of* January, February *and* March 1722, *you have deduced the Difference of Longitude, between* Buenos Aires *and* London, *from an Obſervation made at* Buenos Aires, *by* Pere Feuille, *of the Immerſion of a Star behind the Obſcure Limb of the Moon, and the Place of the Moon computed from your Numbers (as you call them) and found it to be three Hours fifty two Minutes, or fifty eight Degrees. And in the ſame* Tranſaction, *you tell us, That* by comparing your *Chart* of the Variation, with the Longitude thus found, it appears, that in this Caſe a Ship at Sea uſing thoſe Tables *(which were never publiſhed that I can hear of)* and that *Chart*, would by an Obſervation of this Occultation, have fallen with greater Exactneſs on the Coaſt of *America*, than by any Reckoning can be pretended to be done. *This is certainly true, provided thoſe Numbers agree exactly with the Motions of the Moon, and that we had a ready and practical Way of finding the true Time of the Night at Sea, as King* Charles II. *no doubt, was well ſatisfyed of, when he built the* Royal Obſervatory, *and as Mr.* Flamſtead *knew very well, when he took ſuch vaſt Pains to give us a correct* Catalogue *of the* fixed Stars, *as he tells in his Doctrine of the Sphere*; Part 2. Sect. 8. Page 75.

But *ſince an Error of four Minutes in the Moon's Place will create an Error of nearly* 8 *Minutes in Time, which you know cauſes an Error of* *two whole Degrees in Longitude, and conſequently will not intitle any Perſon to a Share in the Reward given by Parliament for the diſcovery of the Longitude; and ſince at preſent there is no certain Way, that I know of, for finding the true Hour of the Night at* Sea; *I cannot think this old Hint new revived can at preſent be of any other Uſe than to recommend your own* Chart (*which by the way is the* Mercator's, *not a* Globular-Chart) *to the World, or elſe to tell us of the Goodneſs of your Numbers, which no body can diſpute till they appear Abroad.*

IN *the mean time, I am perſuaded, if the* Royal Aſtronomer *would convince the World that theſe Numbers do exactly agree with the Heavens, or ſet himſelf in earneſt to correct them if they ſhall be found to err, and teach us withal how to find the Time of the Day or Night ſufficiently true for Nautical Uſes, (a Thing hitherto much wanted) and how a* Teleſcope *of a ſufficient Length may be managed at* Sea; *I am perſuaded, I ſay, that his employing his Time this Way, would much more redound to the Honour of this Nation, and the Improvement of* Navigation, *than in writing a* Preface *to the* Globular Atlas, *and in labouring to promote and encourage a* Whim (*for I can call it no other) brought upon the Stage, rather to put Money into the Pockets of thoſe who are concerned in it, and that to at the Hazard as well as Coſt of thoſe honeſt well meaning Sailors who may be drawn in to purchaſe it, rather for the Sake of a great Name recommending it, than for any real Uſe it is like to be of to Mankind.*

IN *the* Anſwer *to my* Letter, *I am charged with* Billinſgate *Language,* Wapping *Rhetorick, and I know not what: Accordingly we are told in another Place, that you was pleaſed to obſerve, that they who have the worſt Cauſe to defend, commonly make uſe of the moſt opprobious Expreſſions in managing it. If this Obſervation be juſt, I beg you would give the* Anſwer *to my* Letter (*which the Author has told me in Converſation you have not only done him the Honour to reviſe, but aſſiſt him in) a ſecond Peruſal, and then judge who has* the beſt of the Argument. However that be, I can't forbear complaining here of hard Uſage, which I don't well know how to take with ſo becoming a Temper as perhaps ſome may expect; for why ſhould the celebrated Dr. Halley aſſiſt againſt me? If any Man is not equal to the Cauſe he eſpouſes, why does he undertake it? If he be not, he deſerves to reap the Fruits of his Preſumption, and to be diſcarded. But be that as it will, the Aſſertion, as well as Inſinuation that you will write a Preface to the Globular Atlas with your own Hand, and that it ſhall anſwer all the Conditions of the Propoſals, and the juſt Expectation of the Subſcribers, I am willing to believe are equally true with the former, trumpt up at preſent to delude the Ignorant, and to open a Way for them to impoſe upon the Publick with greater Eaſe and Certainty; for I am ſatisfied the Regius Profeſſor, who has no leſs a Subject than the Univerſe for his Contemplation, knows how to employ his Time much better, than to be Inſtrumental in impoſing that upon the Publick, which muſt inevitably redound to the Diſhonour of all thoſe that are concerned in it.

But after all the heavy Charge of Calumny, Aſſurance, &c. which I have the Satisfaction to obſerve is moſtly couched under General Terms, or inſinuated by Interrogatories only; there is but one particular Inſtance attempted to be fixed upon me; and that is, becauſe in Page 2 of my Book, where I was ſpeaking of the Excellency of Mercator's Chart, and ſhewing that the greateſt Mathematicians ſince Mr. Wright's Time have honoured it with their Improvements, and thought their Time well beſtowed in ſo doing, I have this Expreſſion, viz. "And our celebrated Dr. Halley was not a little "delighted with himſelf when he had only found out an eaſy "Demonſtration of the Analogy between the Logarithmick "Tangents and the Meridian Line or Sum of the Secants, a "Thing known fifty Years before." This our ſagacious Author calls an Aſperſion, and asks me, as he thinks very ſmartly, if it be not Dr. Halley's Invention, why ſhould he be ſo delighted with himſelf, &c. but if it is, why ſhould Mr. Haſelden ſay it was known fifty Years before. If this ſage Author would but turn to *the* Tranſactions Nº 219, *for the Months of* January *and* February $169\frac{5}{6}$, Page 202, *he will find that the Doctor himſelf tells us in the 25th Line of that* Page, *that the* Analogy *of the* Logarithmetical *Tangents to,* &c. *was publiſhed by Mr.* Norwood *in his* Epitome of Navigation *above fifty Years before the Doctor publiſhed his* Eaſy Demonſtration *as he calls it, and that Mr.* James Gregory (ſee Page 203) *in his* Exercitationes Geometricæ *had demonſtrated the Truth of this Property twenty ſeven Years before the Publication of this* Tranſaction, *ſo that neither the Property, nor ſo much as the Demonſtration of the Truth of it, was owing to Dr.* Halley, *but only an eaſier Way of proving that ſame Thing which had been known at leaſt fifty Years, and had been demonſtrated to be true at leaſt twenty ſeven Years before.*

Now *that the Doctor was not a little delighted with himſelf, only for hitting upon this eaſy Demonſtration, is plain to me from his own Words in the ſaid* Tranſaction, *and I believe will appear ſo to any one who will be at the Pains to read it; for why ſhould he tell us that the* Demonſtration ſeemed ſo difficult to Mercator (*whom all Men allow to have been a good* Geometrician) that he offer'd to lay a good Sum of Money againſt any that ſhould fairly undertake it, and ſhould demonſtrate that it was either true or falſe? *If the Doctor was not well pleaſed with hitting upon the* eaſy Demonſtration, *why ſhould he tell us that the* Demonſtration of Mr. *James Gregory* was attended with ſuch a long Train of Conſequences and Complication of Proportions, that the Evidence of the Demonſtration was in a great meaſure loſt, and the Reader wearied before he could attain it.

If *the Doctor was not a little pleaſed with himſelf for this lucky Thought, why ſhould he tell us that* the famous Dr. *Barrow*, and the incomparable Dr. *Wallis, Men whoſe Names will live as long as Time ſhall laſt,* met not with his good Fortune, and never ſo much as touched upon this Relation of the Meridian Line to the Logarithmetical Tangents?

In *ſhort, if the Doctor was not more than ordinarily pleaſed with himſelf for being the* Author *of this Way of Demonſtration, why ſhould he be afraid that any one ſhould rob him of the Share he had in the Improvements of this uſeful Part of* Geometry, *and deſire that* none would depreciate what he had done, or detract from that little Share of Reputation (as he modeſtly calls it) which he had in this Thing? *I ſay again, if the Doctor was not very much pleaſed with himſelf, what need was there of all this Pother? Therefore I am ſtill of the ſame* Mind *that the Doctor was not a little pleaſed, but very much delighted with himſelf for having,* &c.

If *then ſo great a Man as our celebrated Dr.* Halley *was ſo pleaſed with himſelf, for what? Not for being the Inventor of the* Chart, *not for the Diſcovery of any new Property, but only with ſhewing us an eaſier Way of demonſtrating a Property which was known fifty Years before, and had been demonſtrated twenty ſeven Years before; how would he have been* tranſported *if he had been the* Inventor *of the* Chart *itſelf, or had himſelf found out the Property? This is a ſufficient Proof of the Excellency and Dignity of the* Mercator's Projection *above all other Contrivances, and is the only Thing I intended to make appear by that Quotation; and there is no Room to doubt but this was your Opinion of it, when you recommended the Peruſal of Mr.* Wright's Correction of Errors in Navigation *to all ſuch as deſign to uſe the* Sea; *a Book written on purpoſe to demonſtrate the Truth of that moſt excellent* Chart, *and to uſher it into the World.*

Mr. Wilſon, *in* Page 26 *of his* Letter, *gives me to underſtand, that if I intend to write again, I ſhould treat of Matter more Uſeful, and write more to the Purpoſe, or elſe introduce it in a Letter to ſome Perſon of leſs eminent Character than the celebrated Dr.* Edmund Halley. *How far the ſubſequent Matter is uſeful and to the Purpoſe, I leave the ſkilful and candid* Reader *to judge; but who it is that* this honeſt Gentleman *would have me addreſs myſelf to I can't imagine.*

You are the Perſon who have recommended this Chart *to the World, and was it not for your Recommendation, they would never have obtained a* Patent, *nor have met with any Encouragement; nor would any body have taken any Notice of it. You are the Perſon who have peruſed, approved and recommended the* Chart, *as appears by the* Propoſals, *and are to ſtand by it and ſupport it. You are the Perſon who are to write the* Preface *to the* Globular Atlas, *and to prove that a Streight Line may be a Curve Line; and a Curve Line a Streight Line, juſt as it ſhall ſuit the Purpoſe of the* Chart. *You are the Perſon who are to prove that an infinite Number of Lines of different Lengths, ſhall every one contain an equal Number of the ſame equal Parts. You are the Perſon that are to make good what Mr.* Wilſon *has publiſhed in the* News-Papers, *viz* That *Mercator's-Chart is* Puzzling, Difficult and Abſurd; and that any one may with as much, nay more Expedition, deſcribe and meaſure the Arch of a Spiral Line, than he can a Straight Line. *And ſince you have undertaken to do all this (as he informs us you have) to whom elſe ſhould I addreſs myſelf?*

No *Man's Character is ſo great as to ſet him above all Mankind, or oblige all People to imbrace implicitly whatſoever he ſhall advance, without enquiring whether it be true or falſe; Infallibility is claimed by none that I know of except the* Church of Rome, *and I hope we have no* Pope *in* Mathematicks; *and therefore to deliver my Thoughts to you freely upon this Affair could not, as I imagined, be deemed any Crime.*

The *greater a Man's Character is, the greater ſhould be his Care and Concern not to let it be abuſed; for the Generality of People are led away with great Names, and thoſe who are not ſo well acquainted with Things as they ought to be, are eaſily made to believe any Thing that comes recommended from a Perſon of whom they have conceived a good Opinion.*

TEACHING *of* Mathematicks *has been many Years, and is ſtill my Buſineſs and Profeſſion, and, as I ſhall always readily embrace and promote any thing that really tends to the Improvement of Science, ſo far as I am a Judge (and I hope in this Matter I may be allowed ſome Share of Knowledge) ſo I think it my Duty, and the Duty of every one concerned, ſtrenuouſly to oppoſe any Thing, that ſhall have the leaſt Tendency to miſguide the Minds of People, and which in its Conſequences may prove fatal to the Lives and Eſtates of many of his Majeſty's beſt Subjects: For theſe Reaſons I have addreſſed myſelf to you as the only Perſon of any known Skill in the* Mathematicks *that has given the leaſt Encouragement to this Thing called* The Globular-Chart, *and therefore don't queſtion, after you have duely weighed and conſidered the Caſe, but you will readily excuſe this ſecond Trouble I have given you, and believe me to be with much Reſpect,*

SIR,

From my School near
Wapping Old-Stairs,
Auguſt 10, 1722.

Your moſt Obedient
Humble Servant

Thomas Haſelden.

TO

Mr. *WILSON.*

SIR,

I HAVE read your Piece Entituled, *The Deſcription and Uſe of that moſt Excellent Invention called the Globular Chart*, &c. and alſo what you are pleaſed to Style, *An Anſwer to my Letter to Doctor* Halley, which you ſay, proves by *Mathematical Demonſtration*, my Principal Argument to be falſe above Three in Five, the reſt Invalid, and the whole Incoherent.

By Principal Argument, I ſuppoſe you mean that which I have made uſe of to prove the *Globular Chart* ſo prodigiouſly falſe in Practice as Twenty in Forty.

By the reſt of my Arguments being Invalid, I ſuppoſe you mean, not only thoſe other which I produced againſt the *Globular*, but alſo thoſe that relate to *Mercator's Chart*.

And by the Whole being Incoherent, I ſuppoſe you mean that every Argument in my Letter contradicts every Argument in it.

That the World may the more plainly ſee how you have made good this bluſtering Part of your Title Page, it will be neceſſary to take Notice of two Things in the Sheet you printed in 1718, to ſhew the Uſe of the *Globular Chart*, viz. Firſt, *Definitions*; and Secondly, *Directions* or *Rules*.

The Intent of *Definitions*, I think, is to explain what is meant by certain Words or Terms of Art uſed in any Science, when the meaning of ſuch Words or Terms of Art is not Obvious: Thus, if any Perſon enquires what is meant by the Words *Elipſis*, *Parabola*, *Hyperbola*, *&c.* in the Mathematicks, he may be anſwer'd according to Dr. *Milnes*, that by the firſt is meant the common Section of the Surface of the Cone, with a Plain lying Parallel to another Plain, which laſt Plain paſſes thro' the Vertex of the Cone, but falls entirely without the Cone.

By the Second is meant the common Section of the Surface of the Cone, with a Plain which is Parallel to another Plain paſſing thro' the Vertex of the Cone, and touching the Side thereof.

By the Third is meant the Common Section of the Surface of the Cone, with a Plain which is Parallel to another Plain paſſing thro' the Vertex of the Cone, and being altogether within the Cone.

Now I would ask any candid Reader if theſe Definitions are ſufficient Helps for any Learner (on a Plain and without the actual cutting of a Cone) to conſtruct any of theſe Curves by? Or whether it be not neceſſary that there ſhould be particular Directions laid down for that Purpoſe? I am perſuaded every one will allow me this Poſtulate, *viz.* that Directions are neceſſary.

In the next Place, ſuppoſe there were particular Directions laid down for the Conſtruction of theſe or any other Curves, I would ask whether any Learner ought to make uſe of theſe Directions, or the Definitions of thoſe Curves to deſcribe them by? I am perſuaded again that every Body would agree to follow the Directions, becauſe the Definitions are not ſufficient for the Purpoſe; if they were, why are Directions given?

Again, Suppoſe that the Perſon who gave theſe Directions ſhould have given them falſe, or not agreeable to the Definitions, would it be ſufficient to clear himſelf from the Imputation of Ignorance or Impoſition, to ſay that by his Definitions, they (the Curves) ſhould have been deſcribed otherwiſe; or in other Words, to ſay, that by his Definitions they ſhould not be deſcribed according to his Directions? This would be fine *Mathematical Demonſtration*, would it not, Sir? and yet this is that very Mathematical Demonſtration by which you ſay you have proved my principal Argument falſe above Three in Five; for the Caſe is the ſame with reſpect to the Deſcription of the Rhumb Lines.

But that the Truth of this may the more fully appear, I will here ſet down both your Definitions of a Rhumb Line, and your Directions or Rules for Drawing one.

Your Definitions I will take out of your Letter to me, *Page* 14. which are, Firſt, That the Rhumbs are inclining Spirals; Secondly, That any Rhumb makes equal Angles with every Meridian it paſſes through. Now do you think, Sir, that theſe Definitions are ſufficient Helps for a Learner to draw Rhumb Lines on the *Globular Chart* by? Certainly you were Conſcious that they were not ſufficient, and therefore you have given *Directions*, which Directions 'twas reaſonable to believe were deſigned for every Practitioner to follow, and therefore I undertook to prove that the *Globular Chart* uſed according to thoſe Directions would lead the Mariner out of his Way 20 Deg. in 40; have not I thus expreſſed myſelf, *Page* 9, *Line* 9 and 18? I come now to ſet down your Original *Directions*, the firſt of which is in *Page* 9. and is for ſolving this Problem on the *Globular Chart*: viz. *A Ship at A in Latitude* 43 *d.* 52 *m. and Longit.* 1 *d.* 40 *m.* W. *from* London, *ſails to* B, *in Lat.* 45 *d.* 52 *m. and Longit.* 3 *d.* 33 *m.* W. *from* London; *the Courſe and Diſtance made good is required.*

Here, after you have directed to prick off the Place of the Ship, and to find her Diſtance from *A*, which I need not here Tranſcribe: You directly and plainly tell us in theſe Words (*Line* the laſt of *Page* 9,) and the firſt and ſecond of *Page* 10. *and the Courſe is found by Inſpection as in other Charts, by obſerving* WHAT RHUMB IT IS NEAREST PARALLEL TO, *as here it is found to be* N. W. *by* N.

Theſe Words, Sir, ſo plainly ſhew, and that without any Explanation, that you intended a Line lying Parallel to a N. W. by N. in the *Globular Chart* ſhould be eſteemed as, or taken for a N. W. by N. Line; that 'tis impoſſible for any Man, without renouncing common Senſe, common Honeſty, and his Title to the leaſt Share of Modeſty, to offer to deny the Force of them, and yet you have done it. Pray Sir, on this Occaſion, reflect a little on your Language in *Pag.* 14. *Lines* 14, 15, 16, of your Letter to me.

Again, in *Page* 12 of your Original Directions, you have this Problem, viz. *Suppoſe I Sail from* Flamborough-Head *in Lat.* 54 *deg.* 08 *min. N. and after I have ſailed N. E. by E. ſome Time, I find myſelf by Obſervation in Lat.* 57 *deg. I deſire to know my Diſtance and Difference of Longit made good.* Your *Direction* or *Rule* for the Solution is this, viz. *Set one Foot of your Compaſſes in the Point that repreſents* Flamborough-Head, *and extend the other to the neareſt N. E. by E. Rhumb, then running one Foot along the ſaid Rhumb, obſerve where the other cuts the Parallel of* 57 *Deg. which falls in the Point* H, *&c.* Now, Sir, as I take it, whoever ſhould Act according to theſe Directions of Yours, would deſcribe a Line Parallel to a N. E. by E. Line for a N. E. by E. and that you might leave no Room to doubt but this was your Intent, is plain from the next Paragraph, where you have theſe Words, viz. *To find the Diſtance, take* 2 *deg. or* 120 *Miles off from the Graduated Meridian in your Compaſſes, and turn them over from* Flamborough-Head *to the Point at* H, *ſetting down every Foot* EQUALLY DISTANT *from the N. E. by E. Rhumb.* Now in *Page* 12, laſt Paragraph, you direct to lay off the Diſtance by Piecemeals on the true Courſe that leads from Place to Place; from whence we may infer, that that Line on which the Diſtance from Place to Place is laid off (or meaſured) by Piecemeals, is the True Courſe; but the Diſtance from *Flamborough-Head* to *H*, is laid off on a Line Equidiſtant from; that is, Parallel to a N. E. by E. by your Directions, and the Line on which the Diſtance is to be laid off is a N. E. by E. by the Queſtion; therefore *by your Directions* a Line drawn Parallel to a N. E. by E is a N. E. by E.

Again, in *Page* 8. Par. 2d. ſpeaking of the great Facility of the *Globular Chart*, you expreſs yourſelf thus, viz. *without any Rules for meaſuring Diſtances, but a Scale of equal Parts; nor of ſetting off a Courſe but by* FOLLOWING *the Rhumb.* Pray, Sir, What may you mean here by following the Rhumb? Sure you muſt mean ſomething very eaſie, or elſe you'd never have brought it into the fine Deſcription you give of the *Globular Chart* in this Paragraph; but I hope you don't call your *New Method*, Page 29 of your laſt Piece, FOLLOWING the Rhumb; I believe all Mankind will take this rather for FEELING, or GROPING after it, than following it.

Again, in *Page* 8 of your Original Directions, you have theſe Words, viz. *As to the Uſe of this* (Globular) Chart, *although it is generally* OBVIOUS *to any one that underſtands the Uſe of common Maps; yet that it may anſwer our End both in Projecting and Publiſhing it, and the Mariners Expectation in buying and uſing it, we ſhall give Directions for the Solution of the following Practical Problems in Globular Sailing.*

Here you firſt ſuppoſe the Uſe of the *Globular Chart* ſo very Obvious, that you hardly need write any Directions about it, and then ground the Reaſon of this Obviouſneſs on the previous Knowledge of the Uſe of common Maps. Now by theſe common Maps you can mean no other than ſuch as the Mariners uſe; from whence 'tis plain, that you either intended that your Maps ſhould be made uſe of as other common Maps, *viz.* as Plain or Mercator, or elſe you intended to impoſe on the Induſtrious Sailor, by making him believe 'tis eaſier than really it is; but if you intended the firſt, then 'tis plain again that you would have us believe, that a Line drawn Parallel to a given Rhumb in the Chart muſt be a Rhumb of the ſame Denomination, becauſe in common Maps which you allude to, it would be ſuch.

From what has been hitherto ſaid, I believe every unprejudiced Perſon will ſee, and I am perſuaded ſuch will think too, that the moſt prejudic'd can't but ſee how very plain it is, that a Line drawn Parallel to a North Eaſt by Eaſt, or any other given Rhumb in the *Globular Chart*, is a Rhumb of the ſame Denomination with ſuch given Rhumb, according to Mr. *Wilſon's Directions*; nay, it ſeems to me that you yourſelf can't think otherwiſe, nor could imagine but that every one would Conſtrue your Directions in the Senſe I have done, or elſe why have you ſo unfairly and ſo baſely left out all theſe Directions I have been hitherto ſpeaking of, and that make againſt you, at that very time when you are profeſſing to do the World and yourſelf Juſtice (*Page* 14. of your Letter to me) by inſerting your Directions VERBATIM as they are in the printed

Sheet of Original Directions? Is this honeſt Dealing, Sir, or is it the Part of a generous Adverſary, thus to tell the World you have inſerted your Directions *Verbatim*, when you have not inſerted one Half of them? keeping the reſt back to obſcure the true State of the Caſe, and does not this confirm what I ſaid, *Page* 5 of my Letter, about impoſing on the three Eſtates of this Realm?

I now come to that Part of your Directions you have thought fit to tell the World is all that you gave, which you give us in theſe Words, *viz. It is owned that the ſame Rhumbs in different Parts of the Chart are not Parallel, as we proved before; but incline towards each other as they come nearer the Pole, and therefore it may be objected, that any Rhumb deſcribed Parallel to another cannot be exact, which we allow; but although the Curvity of the Rhumbs is ſo much that it ought by all means to be regarded, yet their Inclination being but little in a Diſtance of 100 Leagues, may eaſily be accounted for by Judgment; but if you would ſtill be more exact, you may deſcribe your intermediate Rhumb by firſt drawing a Rhumb Parallel to the Given Rhumb on one Side of the Point Sailed from, and then drawing it Parallel to the ſame Rhumb on the other Side of the Point ſailed from, and obſerve the Difference between the two Curves, which by allowing proportionally, you will find where between them the true Rhumb will fall; but this Trouble is not neceſſary, for you may by the former Rules, without this Exactneſs, find the Rhumb to leſs than Half a Quarter of a Point of the Compaſs, which is ſufficiently exact in all Caſes in common Practice.*

Now, from this Direction or Rule, I think it farther appears, that you intended that a Line drawn Parallel to a given Rhumb ſhould be eſteemed a Rhumb of the ſame Denomination with that given one; for in the preceeding Pages you had directed to draw a Line Parallel to a given Rhumb, for a Rhumb of the ſame Denomination, as I have prov'd, and the whole Drift of your foregoing Words tended the ſame way; then you begin this Paragraph with a *'Tis Owned, &c.* Suppoſe an Objection, raiſe it to the Height, give your Rule for obviating it, and yet after all this you conclude the Paragraph in theſe Plain Words, *viz. But this Trouble,* (*viz.* the Trouble of making uſe of, or of following this Rule of mine) *is not neceſſary, for you may by the former Rules,* WITHOUT THIS EXACTNESS, *find the Rhumb to leſs than Half a Quarter of a Point of the Compaſs.*

Now I appeal to every Candid Reader who has read your firſt Printed Directions from End to End, if any other Conſtruction can fairly be put on this Paragraph, (ſo as the whole Sheet may be COHERENT) than this, *viz.* I *Wilſon* muſt confeſs, there is one Objection againſt the Rules I have before laid down; but this, tho' aggravated to the utmoſt is not Material, ſince by the foregoing Rules, WITHOUT THIS EXACTNESS the Rhumb may be found to leſs than Half a Quarter of a Point of the Compaſs: And,

What ſeems to confirm this Conſtruction is, becauſe you have throughout your whole Directions repreſented the *Globular Chart* as ſo eaſie a Projection, and ſo like in reſpect of finding the Rhumb, to Common Maps, that you leave no room to imagine the leaſt Difficulty in it, much leſs ſo puzzling and ſo uncertain a one as your proportional Allowance would be:

But the following Particulars put the Truth of this Conſtruction paſt Diſpute, *viz.* Firſt, That your Rule is ſhort and unintelligible, as will appear further on. 2dly. You have not exemplify'd it, which certainly you would or ought to have done, had you intended it ſhould be made uſe of; and in the third Place, becauſe in your New Sett of Directions you have made no uſe of it yourſelf, but have quite left it out.

Now for a Perſon, among other plain and full Rules, which notwithſtanding their Plainneſs had been illuſtrated by Examples, to lay down a ſhort and obſcure one without any Exemplification, and moreover not to make uſe of it himſelf when Occaſion offer'd: What fairer or honeſter Concluſion can be drawn from theſe Premiſes, than that he never intended it ſhould be uſed at all.

If then this Rule was not deſigned by you for Practical Uſe, as I have prov'd from your own Words and Practice that it was not; ſome may ask, what then was it deſign'd for?

I anſwer, you knowing that the deſcribing a true Rhumb on the *Globular Chart* would be more *puzzling* and *difficult* to be done than on the *Mercators*, which you had repreſented as ſuch, could not hope to ſucced in your Attempts upon that noble Invention, and therefore you prudently frame your Directions after the eaſieſt, tho' falſe Manner; but foreſeeing that you might be called to Account for it, and the Errors of the *Globular Chart* uſed according to theſe Directions expos'd, you cunningly throw in this Paragraph to bring yourſelf off in Caſe of Need, knowing that you could have recourſe to the tedious Method of drawing a true Rhumb on your *Chart* at any time, and this we find verify'd in Fact.

By what has been ſaid, I think I have fairly prov'd, That a Line drawn Parallel to a given Rhumb on the *Globular Chart*, is *according to your Directions*, a Rhumb of the ſame Denomination, and conſequently that the *Globular Chart*, made uſe of according to the Directions which you firſt publiſhed of its Uſe, will lead the Mariner out of his Way 20 Deg. in 40, as I before aſſerted. Let us now ſee your Mathematical Demonſtration to the contrary.

I aſſerted that the Curve *FG*, drawn Parallel to the N. by E. Line, is, *According to your Directions*, a N. by E. Line; that is, if any one follows your Directions to draw a N. by E. Line from *E*, then the Line *FG* will be it. Now if you would prove any thing to the Purpoſe, you ſhould prove my Aſſertion to be falſe, *viz.* that *FG* is not a N. by E. Line *according to your Directions*; you ſhould have ſearch'd your Directions quite through, clear'd up the true Senſe and Meaning of them from the Conſtruction of the Words, compar'd them together and ſhew'd their Agreement, ranſack'd the whole Sheet for confirming Circumſtances, and at laſt have infer'd after this manner, *viz.* from the true Conſtruction of the Words of my Directions, from their Agreement one with another, and from ſeveral Collateral Circumſtances, I infer that *F G* can be no N. by E. Line according to the *Directions* I gave.

Inſtead of this, after you have laid down a couple of Definitions, and Shuffled the Definitions and Directions together in a moſt prepoſterous manner, you at laſt conclude that *F G* cannot be a North by Eaſt Line by the *Definition* you gave; if you intended that the Mariner ſhould deſcribe Rhumbs by your *Definitions* only, why did you give any *Directions* at all? In the ſame manner you Shuffle the Directions and Definitions together in *Page* 15, where you ſuppoſe me aſſerting that *FG* is a N. by E. Rhumb by your *Definitions*, when I aſſerted it was ſuch by your *Directions*. But, Pray Sir, Where have I ſaid that *F G* is a True N. by E. Line according to the *Definition* of a Rhumb, don't I ſay quite the contrary, when I expreſly tell you (*Page* 9, Line *penult*) that a true N. by E. Line from *F* will paſs thro' *H*?

This then is the State of the Caſe, I aſſerted firſt that *FG* is a N. by E. Line according to your *Directions*; and 2dly, That a true N. by E. Line from *F* would paſs thro' *H*, you ſhould have prov'd my firſt Aſſertion falſe; but in the Attempt have unluckily prov'd my ſecond true; therefore again, your Proof of my Invalidity is Invalid, O GLORIOUS MATHEMATICAL DEMONSTRATION! And yet this is the ſole Foundation whereon you build ſo many Appeals to all Impartial Artiſts; but I am perſuaded ſuch will hardly determine in your Favour, eſpecially when they come to find, that you have offer'd ſo great an Affront to them as to endeavour to hide the true State of the Caſe by not inſerting all your Original Directions, but only ſuch as you could beſt pervert to ſerve your Turn:

A notable Inſtance of which Perverſion I will here ſhew.

In that Part of your Original Directions which you have thought convenient to Tranſcribe, and which ſtand in *Page* 14. *Line* 5 from the Bottom, you have added this Clauſe in a Bracket, *viz.* [*Allowing by Judgment.*] Now, that your Intention in ſo doing is to pervert the true Meaning of the Words juſt going before, viz. *Former Rules*, is evident, becauſe the Word *Rules* being Plural, muſt refer to more than one; therefore it could not refer to that ſingle one of allowing by Judgment. Moreover, I can't conceive how allowing by Judgment, which, as you had before uſed the Word, ſignifies no more than gueſſing, can be call'd a Rule; if it can, then to do a Thing by Gueſs is to do it by Rule, which I can't admit; if it cannot, then your Words *Former Rules* muſt refer to the Rules you had before deliver'd, as they evidently do. But give me leave to enquire a little into the Reaſon, or rather the Neceſſity that induced you to add this Clauſe, *viz.* [*Allowing by Judgment*] which is not in your Original Directions. I obſerv'd before that you had left out ſeveral of your Original Rules, which as ill Luck would have it, theſe Words, *Former Rules*, in the Original Sheet, *Pag.* 14. *Line* 10. evidently refer'd to.

This being ſo, there was plainly a Neceſſity of ſupplying their Place with ſomething or other; but the whole Sheet not furniſhing Materials exactly fit for the Purpoſe, you have at the Expence of a Rule in *Grammar*, and of calling a Thing by a Name which it won't bear, choſe what would come neareſt to it, and tell us that the Words, *Former Rules*, which before refer'd to the Rules you have clandeſtinely left out, now refer to the Single Rule (if you muſt needs have it to be a Rule) of allowing by Judgment. Thus 'tis plain, that the leaving out ſome of the Original Rules, was the Cauſe of Sophiſticating the reſt with the Addition of this Clauſe, *viz.* [*Allowing by Judgment.*]

From what has been ſaid, every Impartial Judge may ſee that Mr. *Wilſon* has couragiouſly run away from his Original Directions, and tho' his Heels may be ſo good as to ſecure him from a long Purſuit, yet he prudently all the while cries out, *Stop him*, *Stop him*, *Mathematical Demonſtration*, *Mathematical Demonſtration*, thereby intimating to the Beholders that himſelf is the Purſuer,

I now come to examine that Part of your Mathematical Demonſtration, whereby you pretend to have prov'd the reſt of my Arguments Invalid.

And the firſt I ſhall take Notice of is that relating to your Rule for drawing a Rhumb from a given Point by help of two Curves drawn from that Point, &c. which ſtands in *Page* 14 of the Original Sheet, and alſo *Page* 14 of the Letter to me. Now if I can ſhew that I have kept cloſe to the Senſe of the Word PROPORTIONALLY, then the Concluſion which I before drew will ſtill hold good, and the Validity of your *Mathematical Demonſtration* to the contrary fall of Courſe.

In that Rule you bid us obſerve the *Difference* of the Curves (*E G* and *E F*) WHICH by allowing proportionally (or by allowing of which proportionally) you ſay we ſhall find where between them the true Rhumb will fall. Here the Relative, WHICH, plainly refers to the Word DIFFERENCE; ſo that 'tis the DIFFERENCE of the Curves, (not the DISTANCE of the Curves, for there is no ſuch Word in the whole Paragraph) that we are directed to make a proportional Allowance of. By the DIFFERENCE between two Curves can be underſtood no other Thing but the DIFFERENCE of their Curvatures; that is, how much one curves more or leſs than the other; or in other Words, how much one is more or leſs crooked than the other: In this Senſe all Authors underſtand it, of which I could produce, were it neceſſary, ſeveral Inſtances.

Now if you mean any thing, when you tell us to allow the ſaid *Difference* of Curvatures proportionally, it muſt be, that you would have us find a third Curve, whoſe Curvity ſhould be proportional to the Curvitys of *EG* and E F. But (becauſe the Line *E K* has a Curvity greater than *EF*, and leſs than *EG*) the Curvity of *E K* muſt be to the Curvity of *E G*, as Quantity to Quantity, and the Curvity of *E K* to the Curvity of *E F*, as Quantity to Quantity; therefore *E K* is ſuch a Third Curve as you required; that is, its Curvity bears Proportion both to the Curvity of *EG* and *E F*, (what Proportion you did not ſay) and conſequently is a N. N. E. Line by your Directions, and ſo a N. N. E. Line from *E*, will interſect a N. N. E. Line from *A*, as I concluded in *Page* 11. *Line* 8 of my Letter.

Inſtead of ſhewing the Invalidity of this Concluſion, you run quite away from the Matter in hand, and take no more Notice of the Word DIFFERENCE, than if it had never been mentioned to you; but tell us a long round about Story of the DISTANCE of two Curves. This, Sir, ſeems to me a Caſe exactly Parallel to that of the Old Man *ſelling Plumbs*, (you may remember the Story) who, being aſked the Time of the Day, reply'd, *Twelve a Penny*. RIGID MATAEMATICAL DEMONSTRATION, Sir.

My next Argument, which you ſay you have proved Invalid, is that relating to the Antiquity of the Globular Projection. The Endeavour you have all along uſed to Obſcure the true State of the Caſe, makes it neceſſary in order to invalidate your Proof, firſt to ſet down Part of a Paragraph of your old Directions, *Page* 7. viz. *Now if any body will object that this* (Globular Chart) *is no New Thing, there being* DIVERS *Maps of the* World, Europe, Aſia, &c. *now in Print, with Curvilinear Meridians, Parallels,* &c. *We anſwer it is ſo, but THEY are done from the Stereographick Projection, which is only a Branch of Perſpective, and Confines the Eye to one particular Point of the Surface of the Globe, &c.* Pray, Sir, what can be plainer than that you here aſſert, that all Maps hitherto extant, with Curvilinear Meridians, Parallels, *&c.* (except the *Globular*) were done or deſcribed according to, or after the manner of the Stereographick Projection? Now what I undertook to prove was, that there was a Chart deſcribed after another manner (what manner? Why after a manner different from that whereby the Stereographick Projection is deſcribed, as is evident from the genuine Conſtruction of my Words) 175 Years ago by *Blundevile*, and demonſtrated according to *Blundevile*'s own Conſtruction, that it muſt be the ſame, or be deſcribed after the ſame manner as the *Globular Chart*. Now to prove my Demonſtration to be invalid, you make a couple of *Iff's* or *Suppoſitions* of the obvious Senſe of theſe Words [*after another manner*] and tell me, *IF* I mean it (the Chart deſcribed by *Blundevile*) *Differs* from yours, it is not the *ſame*, (*Wonderful Diſcovery* !) But *IF*, ſay you, I mean it be the ſame as yours, then (*Excellent Mathematical Demonſtration*) it muſt bear all the Definitions of yours.

By the firſt Suppoſition then (tho' I can't allow that to be *Mathematical Demonſtration* which proceeds only upon the Suppoſition of a Perſon's Meaning, without a fair Demonſtration from the Conſtruction of his Words, or other Collateral Circumſtances, that his Meaning muſt be ſo if he means any thing); if it be true, you gain your Point; but I deny the Truth of the Suppoſition, and you have not ſo much as attempted to prove my Meaning muſt be ſo from the Conſtruction of my Words, &c. therefore your Proof of my Invalidity is invalid.

From your Second *Suppoſition*, *viz.* *IF, it be the ſame as yours*, you conclude that it muſt bear all the *Definitions* of yours; but you conclude too ſoon, Sir, for you ſhould have proved in the firſt place that *Blundevile*'s does not bear all the *Definitions* of yours; and then it would have been juſt to conclude, That his is not the ſame as yours; but ſince you have not done this, *Blundevile*'s may be the ſame as yours for any thing you have prov'd to the contrary, and ſo your *Demonſtration* of my Invalidity is Invalid.

What ſtrange *Mathematical Demonſtration* is here! One would have expected that in a *Mathematical Demonſtration* offer'd by a Perſon that writes himſelf Author of ſo many Mathematical Tracts, and has had the Honour to ſerve a Nobleman in the Quality of *Mathematician*, and to be a *Mathematician* in his Majeſty's Navy too, to have found either Definitions, Axioms, allowable Poſtulates, Lemma's, or ſomething from whence at laſt this Concluſion ſhould have been drawn, *viz.* therefore the *Globular Chart* is different from *Blundevile*'s: Inſtead of this we only have it, *IF Blundevile*'s differs from ours, it is not the ſame, and *IF Blundevile*'s be the ſame as ours, then it muſt bear all the Definitions of ours. Certainly, Sir, you could not but ſee the Invalidity of this Demonſtration of yours, and ſo have put it down only by way of Enlargement, which I infer from your manner of providing for yourſelf in caſe of a Diſcovery; for in the next Paragraph, after you have given us another little Specimen of your *huge* Skill in *Mathematical Demonſtration*, (in ſaying *You don't know* but I am miſtaken) you run away from what you had before pretended to demonſtrate the contrary of, *viz.* that *Blundevile*'s Chart, with reſpect to Meridians and Parallels, is the ſame as the Globular; and tell us now that *Blundevile*'s is not the ſame as yours, becauſe his has not the Rhumb Lines drawn upon it as yours has.

But, Sir, I did not undertake to prove *Blundevile*'s the very Identical Chart as yours; if I had, I ſhould no doubt have been laugh'd at, as I believe you will for expecting it; I prov'd that the Meridians and Parallels (the Ground-work or Fundamental Lines of all Charts) of yours are deſcrib'd as *Blundevile*'s would be, according to his own Conſtruction; and I have ſhewn above that you have not demonſtrated my Proof to be Invalid, and therefore your Boaſting is vain.

But you ſay, the Rhumb Lines are the very *Eſſentials* of a Sea-Chart, and therefore *Blundevile*'s cannot be the ſame as yours, becauſe it wants them.

That Rhumb Lines are not eſſential to Sea-Charts in General (you have made no Exceptions) is evident, becauſe both the Plain and Mercator's may be uſed without ſo much as drawing one Single Rhumb Line upon them, (the Meridian and Parallel excepted if you call them Rhumb Lines) as thus; for Inſtance,

Let a Plain or Mercator's Chart be drawn, and a Meridian and Parallel be graduated, and the Sea-Coaſts drawn; let ſeveral Circles of a convenient Radius be drawn in ſeveral convenient Parts of the Chart, thro' the Centers of theſe Circles lay a Ruler Parallel to a Meridian, and make a Mark on their Circumferences, from this Mark divide their Circumferences into 32 equal Parts (or into 360 Degrees if thought convenient) and Sub-divide theſe into Quarters. Theſe graduated Circles, I ſay, will ſupply the Place of Rhumb-Lines; (and the Chart too will be leſs confuſed) for ſuppoſe the bearing of two Places was required, it might be readily found; thus, *viz.* lay a Ruler from one to the other, and with a Pair of Dividers or Compaſſes trace a Parallel to the Ruler or Scale that ſhall paſs thro' the Center of the neareſt graduated Circle, and it will ſhew in its Paſſage over the Circumference the bearing of the two Places.

Again, ſuppoſe it required to trace a Rhumb from a given Point; lay a Scale from the Center of that graduated Circle which lies neareſt the given Point, to that Point in the ſaid divided Circle that ſhews the given Rhumb, and with the Dividers trace a Parallel to the Scale which ſhall paſs thro' that Point, from whence the required Rhumb is required to be traced: This Parallel ſhall ſhew the Track of the Rhumb required. Can your *Globular Chart* pretend to any thing like this, Sir?

Being perſuaded that you will not deny the Truth of this Method, I without farther Trouble conclude, that Rhumb Lines are not eſſential to Sea Charts, and therefore their being or not being inſerted in Charts, makes no eſſential Difference in ſuch Charts, ſo that *Blundevile*'s can't be ſaid to differ from yours ſolely upon that Account; this being ſo, you have an Opportunity of reflecting on your own vaſt Skill in the Art of Navigation, ſince it ſeems you did not know that Sea-Charts might be uſed without the actual Inſertion of the Rhumb Lines; but becauſe you ſo ſtrenuouſly inſiſt upon it in ſeveral Places, that *Blundevile's* cannot be a Sea-Chart for want of Rhumb-Lines; I will produce a couple of very good Authorities to prove that Charts have been called Sea-Charts before the Rhumb Lines were drawn on them.

The firſt ſhall be the famous Mr. *Wright*, who in *Page* 45 of his Correction of Errors, *Chap.* 8. has this Propoſition, *viz.* how to deſcribe the Rhumbs mechanically in ANY SEA-CHART, Globe or Map of what Form ſoever; here you ſee Charts are called *Sea-Charts* before the Rhumb Lines are deſcribed; conſequently 'tis not the actual Inſertion of the Rhumbs that gives them that Denomination.

The Second ſhall be the Celebrated Dr. *Halley*, who in his Certificate to the *Globular Chart* has theſe Words, *viz.* I am of Opinion that this Sort of *Sea-Chart*, ſhewing both the true Diſtances and Bearing of Places, by the Help of the Rhumb Lines drawn THEREON, *&c.* thereon, whereon? Why, on this Sort of *Sea-Chart*, which plainly ſhews again that Charts have been called *Sea-Charts* before the Rhumb Lines have been actually drawn. What has been ſaid upon this Head, Sir, I believe may be taken for an Anſwer to your fourth Demand, in *Page* 40.

Another

Another Argument againſt the *Globular Projection* was, That it would not admit of a Calculus, whereby it might be prov'd if Occaſion required.

Is this true or falſe, Sir, will the *Globular-Chart* admit of a Calculus derived from itſelf, or will it not? You have not proved that it will, therefore my Argument remains valid.

Another thing I took Notice of was, the Method you took to impoſe upon the Unwary Part of Mankind, by ſaying that the *Globular Projection* was TRULY Globular, and agreed to ALL the Definitions of the Globe; I ſhewed that it had not any thing of *Globularity* in it, and that it does not agree to any one *Definition* of the Globe, and you have not *by Mathematical Demonſtration* ſhewn the contrary; therefore you have not render'd what I ſaid invalid; but you ſay 'tis unreaſonable to expect any ſuch *Globularity*, or any ſuch Agreement of *Definitions*. I anſwer it is ſo, but then why were you ſo Confident? Why were you not a little more Modeſt in your Expreſſions? TRULY and ALL you know are very Emphatical and Full, and ſhew very plainly, if they ſhew any thing, your Intention to Impoſe; but tho' it cannot be expected that the Dimention of Thickneſs ſhould be expreſſed upon a Superficies; yet I hope a Circle may be expreſſed on a Superficies, and conſequently one might reaſonably expect from what you had ſaid, to find at leaſt the Meridians in the *Globular-Chart* to be Circles; but they not being ſo, I don't ſee in that Reſpect how the *Globular* is more agreeable to the Globe than the *Mercator*'s-Chart.

I come now to that difficult Queſtion in *Mercator's-Sailing*, *viz.* one Latitude Diſtance and Diff. Long. given, to find the other Latitude, &c. which, as it is of ſo much Conſequence in the Mathematicks, that the Solution of it is likely to open ſome farther Light into the Miſteries of Geometry; will no doubt, if you have done it, render your Name and the *Globular-Chart* famous to all Poſterity; but what will be the Conſequence, Sir, if I ſhould ſhew, notwithſtanding all your ſo poſitive Boaſtings, that you have not ſolv'd it, what ſort of Animadverſions will the World then make on the Word FRONT in the 9th *Page* of your *Book*, *Line* the 6th from the Bottom?

And that you have not ſolved it, I ſhall here prove: But firſt, leaſt according to your laudable Cuſtom you ſhould run from the Queſtion in hand, I muſt fix you faſt there, by Vertue of ſome Matter taken out of your Original Sheet, which ſtands in *Page* 14. and is this, *viz.*

PROB.

PROB. IV.

One Latitude, Diſtance and Difference of Longitude given, to find the other Latitude and Courſe; this we rather choſe to inſert becauſe it is wholly impracticable by Numbers, as has been obſerved in Print by Mr. Colſon, *in the former Editions of his* Mariner's Kalendar.

THIS then is the Queſtion which I ſaid you could not reſolve, and which, in Anſwer to me, you ſay you can reſolve; that is, you can reſolve this Queſtion of *Mercator's Sailing*, mentioned by Mr. *Colſon* in the former Editions of the *Mariner's Kalender*. Now it muſt be granted by all Hands, that the Diſtance there given, is the Diſtance in a Rhumb, and not the Diſtance in the Arch of a great Circle; for if ſo, then it is ſolvable by Numbers, and need not have been propoſed as a difficult Queſtion.

What you had to do then (if you would do what I bid you try to do) was to lay off the given Diſtance in ſuch a manner from *B*, that when the Point *G* was diſcovered, then a true Rhumb drawn from *B* to *G* ſhould meaſure that given Diſtance, or be of juſt the Length given in the Queſtion, this would have been doing the Thing required, Sir; but inſtead of this, after you have laid down the Propoſition, *Page* 34. you run quite away from it, and give an Example not at all to the Purpoſe. For Inſtance, the Prop. ſhould be this, *viz.* One Latitude Diſtance (on a RHUMB LINE) and Diff. Long. given, to find the reſt; and your Example is this, *viz. Suppoſe two Places, one at* B, *in Latitude* 30, *and the other between the North and Eaſt, diſtant from it (in the Arch of a GREAT CIRCLE)* 1195 *Leagues, and in Longitude Eaſt from* B 84. 43. Here, by your Example, the Data are the Difference of Longitude, and Diſtance in the Arch of a Great Circle. This, Sir, is not the Queſtion in *Page* 14 of your Original Sheet, and conſequently not the Queſtion which I bid you try to do; for in that the Data are the Difference of Longitude, and Diſtance on a RHUMB; this you have not done in your whole Book; and I now tell you, That you cannot, tho' in *Page* 8 you very poſitively tell me you can. Now, Sir, conſider a little; In your Old Directions you offer'd at the Solution of the aboveſaid *Problem*, and after I had deny'd that it was poſſible to be done, you attempted it again, and for an Example bring another Queſtion quite different from that in the Debate, and yet ſtill perſiſt in it that you have ſolved the Original Queſtion, *viz.* that in *Page* 14 of your Old Directions. This, Sir, is ſuch an amazing and ſhocking Inſtance of a harden'd FRONT that one ſhall rarely find, and gives me a fair Opportunity of calling upon you again to reflect a little on your Language in *Page* 14, *Line* 14, *&c.* and to conſider well whether this, and what you ſay, *Page* 17. *Line* 18, (*viz. that 'tis below you to aſſert what you cannot prove*) COHERE, ſince then you have not ſolved the aforeſaid Queſtion by the *Globular-Chart*; I preſume you have not demonſtrated what I ſaid on this Head to be invalid.

Another

Anotherthing I ſaid againſt the *Globular-Chart* was, that it is Deficient, and that on many Accounts. As firſt, Becauſe thereon cannot be repreſented the whole Navigable World at one View: This you have not ſo much as attempted to ſhew the contrary of, 'tho this is one chief Reaſon why it is *Inſufficient* in the Art of Navigation, and therefore what I ſaid, I ſee you do allow, is valid.

Another Deficiency I ſaid was, that a *Globular-Chart* could not be made, which ſhould contain Part North and Part South Latitude, without loſing your Scale of Equal Parts, *&c.*

In Oppoſition to this, you tell me *Page* 22, that you have patch'd up ſomething that will come pretty near theMatter, if I may take your Word for't; but This is not *Mathematical Demonſtration, Sir*, this does not make good your Title Page. Juſt ſuch *Mathematical Demonſtration* you produce alſo in the next Paragraph about ſetting off the true Diſtance on a given Rhumb.

In what has been ſaid, Sir, I think I have fairly proved the ſecond of thoſe things which you call upon me for in *Page* 40, *viz.* that *F G* is a N. by E. Rhumb *by the Directions you gave*; and alſo that you have not brought ſo much as one *Mathematical Demonſtration* to prove the reſt of my Arguments relating to the *Globular Chart* invalid; but have gone on in the ſame Vein of Shuffling with which you began in your Propoſals.

What comes next to be conſider'd relates to the *Mercator's-Chart*, and your Manner of *Mathematically Demonſtrating* what I have ſaid on that Head to be invalid.

In my Title *Page* I called the *Mercator's-Chart, The moſt excellent Invention*, viz. *of Sea-Charts*: This you plainly deny, or have deny'd in the following *Advertiſement* in the *Poſt-Boy*, from *July* 28 to *July* 30 1719. Your *Advertiſement* is as follows, *viz.*

For the *Improvement* of *Navigation*, &c.

THERE is now going forward a compleat Sett of Sea-Charts, *including all the known Navigable Parts of the World, and repreſenting them according to the* Globe *itſelf, without the groſs Errors of the* Plain-Chart, *or the puzzling Difficulties, Abſurdities, falſe Views and Deficiencies which the Authors hereof have* (now) *proved the* Mercator's Projection *liable to, and rendering* Great Circle-Sailing *as Eaſy and Practicable as Sailing by the* Plain Chart; *and for the Satisfaction of any Gentlemen,* &c. *of the Truth hereof, there are ſeveral Specimens of this Work already Printed, Approved, and Recommended by Dr.* Edmond Halley, *and Captain* John Merry, *which Specimens are to be ſeen at any of the Authors, viz.* John Harris *in Bullhead-Court, Newgate-ſtreet;* John Senex *at the Globe* in *Salisbury-Street, and* Henry Willſon *at the* Sieve *in the Little Minories.*

NB. *There being great Complaints for Want of a True and Large* Chart *of the* Northern Navigation, *including* Archangel *and the* Baltick Sea: *We are now upon it, and ſhall finiſh it in a ſhort Time.*

Here you may ſee that you have repreſented the *Mercator's-Chart* as puzzling, difficult, and falſe, tho' now in *Page* 10 of your *Book* you deny it. But why do you run away from your Aſſertions Sir? does not this Practice ſhew plainly that you are aſhamed of what you have done, and ſaid againſt that moſt excellent Invention? Or at leaſt, does it not give ſhrewd Suſpicion that your cauſe is bad? Conſider, Sir, how it commonly falls out in Diſputes in Law, with thoſe that are found in two Stories.

But as you are willing to ſtand by theſe three Things, *viz. Firſt*, That the *Mercator's Chart* is Abſurd; *Secondly*, Difficult; and *Thirdly*, Deficient, give me leave to look a little into your *Mathematical Demonſtration* of theſe Particulars.

Firſt, You ſay the *Mercator's-Chart* is Abſurd, and the Argument you bring to ſupport your Aſſertion is, becauſe its very Foundation is ſo. Now becauſe all Conſtructors of true Charts have the Idea of the Globe firſt in their Minds, from which as a Principal, Original, or Foundation, they take their Conſiderations in order to make their Productions agreeable thereto, in reſpect of Truth: 'Tis plain that the *Globe* is the Foundation of all true Charts; if this Foundation be falſe, then the *Globular-Chart* muſt be falſe too.

But on the contrary, you imagine that the *Cylinder* is the Foundation of the *Mercator's-Chart*, which is no more than an Hypotheſis or Suppoſition, not a Foundation, becauſe it is not firſt in the Mind; and the Uſe of this Hypotheſis, is to ſhew by what Steps the Surface of the Globe may be reduced to a Plain Surface (as Mr. *Wright* himſelf aſſures us, *Page* 9, *Line* 24, of his *Correction of Errors*,) *viz.* 1ſt. The Globe is ſuppoſed to be ſwell'd into a Cylinder, then the Surface of this Cylinder is ſuppoſed to be extended into a Plain: Here are two Hypotheſis, Sir, but ſtill the Globe is the Foundation, becauſe it is the firſt in the Mind. The Foundation of the *Mercator's-Chart* then is not Abſurd (except you'll ſay the Globe is ſo) and therefore your Argument is invalid. But you ſay, before we can form any Conception of the *Mercator's Projection*, we are obliged to ſuppoſe the Globe to be what it is not (a Cylinder) *&c.* but if you'll be pleaſed to look into *Page* 11 and 12 of my *Book*, you'll find that there is no ſuch Neceſſity; for there I have ſhewn how a *Mercator's Chart* may be form'd upon another Hypotheſis.

Secondly, You ſay that *Mercator's Chart* is Difficult, and the Reaſon you alledge why it is ſo, is becauſe the Parts remote from the Equinoctial are ſo extended that they can't be meaſured by the ſame Scale of equal Parts. There are but

two

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Here you may ſee that you have repreſented the *Mercator*'s-*Chart* as puzzling, difficult, and falſe, tho' now in *Page* 10 of your *Book* you deny it. But why do you run away from your Aſſertions Sir? does not this Practice ſhew plainly that you are aſhamed of what you have done, and ſaid againſt that moſt excellent Invention? Or at leaſt, does it not give ſhrewd Suſpicion that your cauſe is bad? Conſider, Sir, how it commonly falls out in Diſputes in Law, with thoſe that are found in two Stories.

But as you are willing to ſtand by theſe three Things, *viz. Firſt*, That the *Mercator*'s *Chart* is Abſurd; *Secondly*, Difficult; and *Thirdly*, Deficient, give me leave to look a little into your *Mathematical Demonſtration* of theſe Particulars.

Firſt, You ſay the *Mercator*'s-*Chart* is Abſurd, and the Argument you bring to ſupport your Aſſertion is, becauſe its very Foundation is ſo. Now becauſe all Conſtructors of true Charts have the Idea of the Globe firſt in their Minds, from which as a Principal, Original, or Foundation, they take their Conſiderations in order to make their Productions agreeable thereto, in reſpect of Truth: 'Tis plain that the *Globe* is the Foundation of all true Charts; if this Foundation be falſe, then the *Globular-Chart* muſt be falſe too.

But on the contrary, you imagine that the *Cylinder* is the Foundation of the *Mercator*'s-*Chart*, which is no more than an Hypotheſis or Suppoſition, not a Foundation, becauſe it is not firſt in the Mind; and the Uſe of this Hypotheſis, is to ſhew by what Steps the Surface of the Globe may be reduced to a Plain Surface (as Mr. *Wright* himſelf aſſures us, *Page* 9, *Line* 24, of his *Correction of Errors*,) *viz.* 1ſt. The Globe is ſuppoſed to be ſwell'd into a Cylinder, then the Surface of this Cylinder is ſuppoſed to be extended into a Plain: Here are two Hypotheſis, Sir, but ſtill the Globe is the Foundation, becauſe it is the firſt in the Mind. The Foundation of the *Mercator*'s-*Chart* then is not Abſurd (except you'll ſay the Globe is ſo) and therefore your Argument is invalid. But you ſay, before we can form any Conception of the *Mercator*'s *Projection*, we are obliged to ſuppoſe the Globe to be what it is not (a Cylinder) *&c.* but if you'll be pleaſed to look into *Page* 11 and 12 of my *Book*, you'll find that there is no ſuch Neceſſity; for there I have ſhewn how a *Mercator*'s *Chart* may be form'd upon another Hypotheſis.

Secondly, You ſay that *Mercator*'s *Chart* is Difficult, and the Reaſon you alledge why it is ſo, is becauſe the Parts remote from the Equinoctial are ſo extended that they can't be meaſured by the ſame Scale of equal Parts. There are but two Caſes you know where meaſuring upon the *Mercator*'s *Chart* is required, and thoſe are firſt on a Parallel or Eaſt and Weſt Courſe: Secondly, upon an Oblique Courſe. As to the firſt, if you look into *Page* 18, *&c.* *Prop.* 8. of my *Book*, you will find a Method of meaſuring the Diſtance between *G* and *F* in the *Mercator*'s *Chart*, *Page* 6. by help of the graduated Parallel, which I hope you'll allow is a Scale of equal Parts: And as to the ſecond Caſe, if you look into *Page* 23. *Prop.* 10, you will find the Diſtance between *E* and *G* in the ſaid Chart meaſured by help of the ſame graduated Parallel; that is, by the ſame Scale of equal Parts, your Argument then relating to the Difficulty of *Mercator*'s *Chart* is *Invalid*; and this may ſerve for an Anſwer to the third Thing you call upon me for in *Page* 40. of your *Book*.

But ſince you have thought that the *Mercator*'s *Chart* could not be meaſured by one and the ſame Scale of equal Parts, and have brought it as an Argument to prove that Chart to be *Difficult*; you ought not to take it ill if I refreſh your Faculties a little, and put you in the right Way; for I perceive by many Paſſages in your *Book* that you are very apt to take one Thing for another; which makes me believe, you are either a little dim-ſighted, or elſe that you are prone to *Nod* at certain Intervals. Be pleaſed to take Notice then, that 'tis the *Globular Chart*, not the *Mercator*'s, that requires ſeveral different Scales of equal Parts to meaſure by: Witneſs, no leſs than a whole Dozen of them in the Chart in your *Book*. And you tell us, *Page* 29, *Line* 16, *&c.* that in the Charts themſelves you will make one for every Degree of Latitude, or for every two Degrees at leaſt; how prodigiouſly *Difficult* then muſt your *Globular Chart* be? wherein you are obliged to have as many different Scales of equal Parts as there are Degrees of Latitude: This is your own Argument, Sir, and ſurely can't poſſibly be *Invalid*.

In the third Place, you ſay *Mercator*'s *Chart* is Deficient, and the Reaſon you give for it is, becauſe you think the following Queſtion cannot be reſolved by it, *viz.* *A Ship at* B *in Latitude* 60, *and an Iſland at* C *in Latitude* 70, *both under one Meridian, the Ship ſails from* B, North Eaſt, *into Latitude* 70; *required how many Miles the Ship is* (*in a Parallel*) *from the Iſland at* C; this you ſay cannot be truly reſolved by the *Mercator*'s *Chart*; give me leave to try however. The Iſland at *C*, you know by the *Prob.* is in Latitude 70, and the Ship ſails from *B*, N.E. till ſhe comes into the ſame Latitude, and the Thing to be meaſured is that Piece of the Parallel in the *Mercator*'s *Chart* that lies between the Iſland *D* and the Ship, and to do this, is no more than to meaſure or find the Diſtance between two Places lying in the ſame Latitude, which I before ſhewed you how to do, in *Prob.* 8, *Page* 18 of my *Book*, and that by a Scale of equal Parts too. Here I beg the Favour of you to reflect a little on your Language in *Page* 25, *Line* 25, *&c.* about *poor Common* Matter; which as Common as it is, it ſeems you have not as yet attained to the Knowledge of. Thus, Sir, I hope, I have defended the Charge you brought againſt *Mercator*, by ſhewing that the Arguments you have brought to prove it Abſurd, Difficult and Deficient, are invalid.

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But there is one thing more to be taken Notice of, *viz.* What you have ſaid, *Page* 11. about one Mile in ſix. You ſaid before that the *Mercator*'s *Chart* was falſe one Mile in ſix; but now you recede from that, and tell us, that the *Operation* by *Mercator* is falſe by one in ſix in ſome Caſes, (the Plumb-Man again, Sir,) and you offer to prove it by ſolving a Queſtion before mentioned, *viz. Suppoſe a Ship at* B, *in Latitude* 60, *and an Iſland at* C, *in Latitude* 70, *both under one Meridian; the Ship ſails from* B, *N. E. into Latitude* 70, *required to know how many Miles the Ship is (in a Parallel) from the Iſland at* C. Firſt, ſay you, *the Diſtance in the Parallel is* 492; and this, *Page* 11. near the Bottom, you call *Departure.* Secondly, You ſay, *That all School-Maſters that you know of, call the ſhorter Perpendicular in a* Mercator*'s Queſtion, Departure.* Now becauſe you call the firſt Departure, and the School-Maſters call the ſecond by the ſame Name, *Departure* and *Departure,* think you, muſt be all one. This then, Sir, muſt be your Intent, if you intend any thing, *viz.* to make us believe that the ſhorter Perpendicular in a *Mercator*'s Queſtion, and the Arch of a Parallel comprehended between the Ship (*whatever Courſes and Diſtances ſhe makes good*) and the Meridian ſhe departed from, have been eſteemed one and the ſame thing; if you intend otherwiſe, you know, it ought not to be expected that the Operation by *Mercator* ſhould bring out the ſame, *viz.* 492; and then your Concluſion, (*viz*, that the Operation is falſe becauſe it brings out ſomething differing from 492) will not hold good: This then being your Meaning from the Conſtruction of your Words, let us compare it with what you ſay in another Place, and ſee how they COHERE. In *Page* 20, you have this famous *Corollary, viz.* Hence both theſe ſorts of Departure MAY be truly expreſſed and meaſured on the *Mercator's-Chart.* How! Does Mr. *Wilſon* ſay, in *Page* 20, that there are two ſorts of Departure, when he takes ſo much Pains in *Page* 11, to make the World believe that theſe two are but one and the ſame? and makes it the Foundation too of his Proof of the Falſity of the Mercatorian Calculus one in ſix: This is Self-Contradiction with a witneſs, Sir, and entirely Invalidates your one in ſix.

But why do you ſay, *Page* 11, *Line* 12, that all Teachers of Navigation that you know of, have ſaid that the ſhorter Perpendicular in a *Mercator*'s Queſtion repreſents that Arch of a Parallel comprehended between the Ship and the Meridian ſhe ſailed from: This, none of thoſe you have mentioned (tho' they do call that Perpendicular, *Departure*) have aſſerted; and tho' they are all now dead, and can make no Return of your Compliment, yet ſurely the Living will take ſome Notice of it, becauſe it is no leſs than taxing them with downright Ignorance in their Teaching. But, Sir, if the Operation by *Mercator* is falſe one Mile in ſix, in ſome Caſes, how will it ſerve for a Standard to prove the Truth of the *Globular-Chart* by? I am very ambitious of having one *Corollary* in my Book as well as you, and I think it will come in here well enough. Mr. *Wilſon* ſays, that the Operation by *Mercator* is falſe one Mile in ſix in ſome Caſes, and Mr. *Wilſon* makes uſe of the Mercatorian Calculus to prove the Truth of the *Globular-Chart*, and ſays that it agrees with the ſaid Calculus.

COROLLARY.

HENCE the *Globular-Chart* is falſe one Mile in Six, in ſome Caſes.

It remains to ſay a few Words relating to the Objections, which you ſay I have wrapt up as ſick Patients do their bitter Pills, &c. and then I think I ſhall have made good againſt you whatever I have ſaid in my Letter, either againſt the *Globular*, or in favour of *Mercator*'s-*Chart*.

I called theſe Objections trivial Things, and ſaid they were eaſily refuted. 'Tis neceſſary here to ſettle the Meaning of the Word *Refuted*, of which you may ſatisfy yourſelf by looking into Dr. *Littleton*, where you'll find that *Refutare Hoſtem* ſignies to vanquiſh an Enemy; and this may be ſaid to be done when he is diſarm'd of his Power, there is no Neceſſity for an Annihilation in order to Vanquiſh, Sir; if then I can diſarm your Objections (the Enemies to *Mercator*'s-*Chart*) and render them of no Force; I hope it will be allowed that I have *vanquiſhed*, *overcome*, or *refuted* them.

I will ſingle out that which you inſiſt upon all along as the moſt Material; for if that falls, the reſt will fall of Courſe; and it is this, *viz.* that the *Mercator*'s-*Chart* repreſents Places out of Proportion with reſpect to Magnitude.

The general Practice of Map-makers, both of our own and foreign Countries, ſhews plainly the Invalidity of this Objection; for they never give themſelves the trouble of deſcribing in Sea-Charts the particular Boundaries of Countries, but the Sea-Coaſts only; and we don't find that ever there was any Complaint made of them on that Account, which certainly there would have been had the Magnitude of Countries been abſolutely neceſſary for Seamen to know; and we ſhall ſee when your *ATLAS* is done, whether your own Practice don't confirm the ſame thing.

But pray, Sir, be ingenious for once; do you think that a Ship can find her Way ever the better from *England* to any particular Part of *China*; for inſtance, by knowing that *China* is bigger than *England*? Does the Mariner make uſe of the Magnitudes of theſe Countries in his Calculations for finding the Courſe and Diſtance he muſt ſteer? This you have given up before; but I remember in a former Letter of yours to me about this Affair, you have theſe Words, *viz.* "If "Seamen do not want to know which is biggeſt, *France*, *Spain*, *&c.* yet they "want to know which is biggeſt, the *Mediterranean*, the *Baltick*, the *White-Sea*, *&c.*" This, I muſt confeſs, is a great Miſtery to me; for I can't ſee what Buſineſs that Perſon has with the *Streights* who ſails in the *Baltick*, or he with the *Baltick* who ſails in the *Streights*. For inſtance, Suppoſe a Sailor bound from a Place in the *Mediterranean* to any other Place in that Sea, what he wants to know is, the Courſe and Diſtance he muſt ſteer; this he may obtain either by Calculation or by his Chart; if from the former, he muſt have given the Difference of Latitude, and the Eaſting or Weſting between the two Places. Now, pray Sir, are theſe Data to fetch'd from the *Baltick*? Can the Knowledge he has that the *Baltick* is not ſo big as the *Mediterranean* furniſh him with theſe Data? If he attempts to find the aforeſaid Courſe and Diſtance by his Chart, muſt he have recourſe to the *Baltick* to ſee whether it be bigger or leſs than the *Mediterranean*? If ſo, then 'tis neceſſary that every Man who takes Charge of a Ship to the *Mediterranean* ſhould buy as well a Chart of the *Baltick* as of the *Mediterranean*; and for the ſame Reaſon, he who is bound to the *Eaſt-Indies* ought to be furniſh'd with Draughts of the *Baltick*, *White Sea*, *Black-Sea*, &c. and indeed where-ever any Perſon is bound, if it be neceſſary for him to know the Magnitude of particular Seas, then he ought to buy Draughts of all the particular Seas in the World before he can perform his particular Voyage. However beneficial this Doctrine may be to the *Globular Atlas*, yet I am perſuaded that the Author of ſeveral Treatiſes in Navigation, Aſtronomy, &c. cannot defend it; but if he will attempt it, I muſt beg of him firſt to conſider, that it may be as neceſſary for a Man to know the ſeveral bigneſs of the Seas in the Moon, &c. (for ſome People are of Opinion that ſuch there are) before a Man can find his Way in the *Mediterranean*, ſince 'tis certain that he lies under no more Neceſſity who ſails in the *Mediterranean* to conſider the Magnitude of the *Baltick*, than he does to conſider the Magnitude of the Moon. Since then the induſtrious Mariner has no Occaſion to have the *Baltick* in his Thoughts when he ſails in the *Mediterranean*, which I believe no Man will be ſo fooliſh as to aſſert, then the comparative Magnitude of Seas can be of no uſe to Seamen, and conſequently the *Mercator*'s-*Chart* is never the worſe, becauſe it cannot repreſent them in their real Magnitudes, nor the *Globular* ever the better becauſe it can.

Now a Word or two about your long Digreſſion concerning Departure. I aſſerted that the *Mercator*'s-*Chart* has no Lines in it expreſſing that Thing, and to prove me wrong, you ſay, *Page* 11, *Line* 8 from the Bottom, you *believe* it MAY be expreſſed thereon; and a little farther you have it, *Ergo* the Departure MAY be expreſſed; and a little further, Departure MAY be meaſured, and *Page* 20 you have this *Corollary*, *viz.* Hence both theſe ſorts of Departure MAY be truly expreſſed and meaſured on the *Mercator*'s-*Chart*; but pray what's all this to the purpoſe? I ſaid the *Mercator*'s-*Chart* HAS no Lines in it expreſſing the Departure; have you proved that it has? You have ſpent many Words indeed to prove that it MAY have, but that is not the thing to be proved; this is mere trifling, Sir, and gives me Occaſion once more to put you in Mind of the old Plumb-Merchant.

But to ſhew the World what a Dabſter you are at *Mathematical Demonſtration*, after you have ſpent almoſt three Pages to prove that Meridian Diſtance MAY be expreſſed on *Mercator*'s-*Chart*, immediately in *Page* 21 you contradict all that you had ſaid before; and tell me, *You agree with me that Meridian Diſtance cannot be expreſſed ſo as to be truly meaſured by a Scale of the ſame Equal Parts*: Now there is no one Eaſt and Weſt Line on the *Mercator*'s-*Chart* but may be meaſured by a Scale of the ſame equal Parts, (*viz.* the graduated Parallel) by *Prop.* 8. *Page* 18 of my Book; therefore it follows from your own Argument that Meridian Diſtance is not (now at this time) expreſſed on the *Mercator's-Chart*. This kind Acknowledgment, Sir, was all I wanted; but pray where is your Mathematical Demonſtration of my *Invalidity* all this while?

Moreover, in *Page* 22 *Line* 8, you tell us that Meridian Diſtance is limitted on the *Mercator's-Chart* by Curve-Lines; but there are no Curve Lines drawn in the *Mercator's-Chart*; therefore again, from your own Words, Meridian Diſtance is not expreſſed therein.

Now becauſe (as I proved before) Meridian Diſtance is uncertain and not to be depended upon, but would deceive ſuch as truſted to it; as the *Mercator's-Chart* would have been more intricate and confuſed if that thing were expreſſed upon it; therefore certainly the Value of the *Mercator's-Chart* muſt be greater for not expreſſing it. Having juſtify'd my principal Argument as you call'd it, and ſhewn that you have not proved the reſt invalid. The laſt thing to be conſidered is, how you have proved my whole Letter to the Doctor *Incoherent*.

Now in order to have made good your Title Page, one might reaſonably have expected that you would have given ſuch a Number of Inſtances of this Matter that might have put it paſt Diſpute; but I find no ſuch Inſtances: You *wonder* at my *Front* indeed, but I never knew that the Paſſion of *Wonder* was accounted *Mathematical Demonſtration* before; I muſt confeſs you have attempted, *Page* 42, to prove Part of my Book Incoherent; but this, Sir, is not proving the Letter ſo, one would have thought that Mr. *Wilſon* who wonders at my *Front* for ſending an inconſiſtent Letter to a worthy Gentleman, and had told the World that every Argument in that Letter contradicts every Argument in it, ſhould have taken ſome Pains at leaſt to have made his Aſſertion good; but I find 'tis a common thing with you (as may be ſeen in ſeveral Places above) to promiſe one thing and attempt the Performance of another: Do you call this *Coherency*, Sir.

But ſince you think you have found ſomething in my Book that looks to you like an Incoherency, give me leave to undeceive you.

In *Page* 42, you tell me, that I ſay, that the *Mercator's-Chart* may be meaſured by a Scale of Equal Parts, and at the ſame time make a Scale of unequal Parts to meaſure by, and this you call an Incoherency; but Sir, as I take it, theſe are but two different Methods of meaſuring Diſtances, one ſhorter than the other, and is this an Incoherency? Is it incoherent for a Perſon to ſhew how to do a thing two Ways? Or when he is about to ſhew a new way of doing a thing, is it incoherent to give an account of the Method before in uſe? This has been the Practice of very *Celebrated* Men, Sir; and if I have acted incoherently in this, I have but followed their Example.

Again, you ſay 'tis incoherent to make a Scale to meaſure Departure or Meridian Diſtance on the *Mercator's-Chart*, becauſe that Chart has no ſuch thing expreſſed in it. I ſuppoſe you'll allow that the Apparent Diſtance between two Places in the ſame Latitude on the *Mercator's-Chart* is equal to the Difference of Longitude between them; do you call this Apparent Diſtance the true Meridian Diſtance? If you do, then the Meridian Diſtance and Difference of Longitude are always equal, which cannot be unleſs on the Equinoctial itſelf. Since then 'tis this Apparent Diſtance that is taken in the Compaſſes and applied to the Scale, 'tis plain that the Apparent Diſtance or Difference of Longitude is the thing actually meaſured, and not the real Meridian Diſtance. Now the Apparent Diſtance is expreſs'd, and the Scale is adapted to meaſure that, then pray where is the Incoherency.

Again, *Page* 43, you tell me I make uſe of a rough Specimen of the *Globular Projection* to illuſtrate Departure or Meridian Diſtance by; but if you look a little cloſer, you will find that the Meridians in that Specimen are Arches of Circles, and conſequently is rather a rough Specimen of the Stereographick than of the *Globular Projection*; you are very good at Miſrepreſentation, Sir.

Again, You ſay I am inconſiſtent, becauſe I illuſtrate Departure or Meridian Diſtance in a Book of the Uſe of *Mercator's-Chart*, when Meridian Diſtance is not expreſſed in that Chart: But the Reaſon of that Illuſtration was, to ſhew how uncertain a thing Meridian Diſtance was in Navigation, and from thence to infer the Excellency of the *Mircator's Chart*, which did not expreſs it; and whether this be impertinent or inconſiſtent, when I was about, profeſſedly, to ſpeak of the Excellency of that Chart, I leave every unprejudiced Reader to judge.

There being ſome things that have not come ſo commodiouſly in my way, I ſhall now take Notice of them.

In *Page* 3, you tell the Reader that the *Globular Chart* had the Approbation of learned and impartial Men as a great IMPROVEMENT in Navigation, eſpecially in that uſeful (but hitherto intricate) Part, *viz.* ſailing by the Arch of a great Circle. That the Reader may judge whether you have told him true or falſe, I will here ſet down the Certificates both of Dr. *Halley* and Captain *Merry*; theſe Gentlemen I know are able Navigators, and therefore I ſuppoſe they are the Perſons you mean.

Dr.

Doctor Halley's *Certificate to the* Globular-Chart.

I AM of Opinion that this ſort of Sea-Chart, *ſhewing both the true Diſtances and Bearing of Places by the Help of the* Rhumb-Lines *drawn thereon, may be of good Uſe to Navigators; more eſpecially to ſuch as ſhall be deſirous to ſail by the Arch of a Great Circle.*

E. H.

Captain Merry's *Certificate to the* Globular-Chart.

IT is my Opinion that this Sea-Chart, *ſhewing both the true Longitudes and Latitudes of Places, and alſo the true Bearings by the* Rhumb-Lines *drawn thereon, will be of good Uſe to Navigation, particularly in ſailing by the Arch of a Great Circle.*

J. M.

Here, Sir, you may ſee that one of theſe Gentlemen ſays it MAY, and the other ſays it WILL be of good Uſe in Navigation; but neither of them ſays that it will be of better Uſe than *Mercator*'s-*Chart*, or that it is any IMPROVEMENT in Navigation, much leſs a GREAT one. Do you not then continue to abuſe their Liberty, and to impoſe upon Mankind? You ſay indeed, *Page 9.* that you can ſufficiently juſtify yourſelves in this Point; pray then why have you done it? why did you not prove by the foregoing Certificates that you had a Liberty to vilify the *Mercator*'s-*Chart*?

In the next Page, you have a Heap of opprobious Language, intended, I ſuppoſe, againſt the Perſon or Perſons whoſe Vaſſal you intimate I am. I beg the favour you'd compare this with what you have ſaid of the ſame Perſon, in *Pag. 26.* ſee how they *Cohere*, and then think upon the Fable of the Satyr and the Traveller.

In *Page 6.* You tell me that the Doctor made this Obſervation upon reading my Letter, *viz.* That they who have the worſt Cauſe, commonly uſe the moſt opprobious Expreſſions in managing it. I muſt confeſs I did pay you a Compliment or two that way in my Letter, becauſe I thought you deſerved them; but you have returned them an hundred fold; for beſides a very plentiful Mixture throughout your whole Book, half your 24th and 26th, and your whole 25th *Page* is filled with nothing elſe; ſo that I think I have a very good Authority (if what you ſaid be true) to pronounce your Cauſe to be the worſt.

In *Page* 27 of my *Book*, I recommended the *Mercator*'s-*Chart* as the moſt true and expeditious Chart in the World. Now I expected in a Book writ on purpoſe to ſhew the ſuperior Excellency and Expedition of the *Globular-Chart*, to have found a *Mathematical Demonſtration* of the Invalidity of my Arguments, but *to my great Surprize I find no ſuch thing.* Indeed you tell me, *Page* 23, in a very orderly manner that, If Firſt Latitudes; Secondly, Longitudes; Thirdly, Courſes; Fourthly, Diſtances, can be diſcovered and ſet off upon the *Globular Projection*, and that to ſufficient Exactneſs, that then I cannot deny its being equal to any other for Practice in all Caſes: But I do deny it, Sir, and that upon this Account, *viz.* becauſe it wants Expedition; for ſuppoſing the things abovementioned can be diſcover'd and ſet off on the *Globular Chart* with the ſame Certainty as on the *Mercator*'s (which by the way I deny,) yet if the ſame things cannot be done with the ſame Expedition alſo, my Aſſertion muſt ſtill hold good: But pray, how comes it to paſs that you have no where ſaid that the *Globular Chart* is MORE True and MORE Expeditious than *Mercator*'s? ſince you know if it be but equally ſo, this cannot be a ſufficient Reaſon for laying the *Mercator*'s aſide, ſince this would be juſt as if a Man ſhould throw away a very ſtreight Stick, and in its room chooſe a very crooked one to ſupport himſelf withal, which I am perſuaded would be look'd upon as a very ridiculous way of proceeding.

In *Page* 13, You acknowledge that *Ptolomy* has a *Globular Projection*, the ſame as yours with reſpect to Meridians and Parallels; but you will not allow it to be the ſame Projection as yours, becauſe it has not the Rhumb-Lines. (You make me laugh, Sir, tho' I am not half well, as the *Scotch* Proverb has it) and in the next Page you magnify yourſelf for bringing to Perfection a thing which the united Studies of ſo famous Men could not do: Now this perfecting of the old Projection of *Ptolomy*'s conſiſts, it ſeems, in deſcribing the Rhumb-Lines, which Mr. *Wright* has ſhewn us long ſince how to do, in *Page* 45 of his *Correction of Errors*, tho' you fondly dream that this was now (and not till now) diſcover'd.

In *Page* 14, *Line* 30, You ſay that a Line drawn Parallel to a Given-Rhumb, can be no Rhumb at all; and yet in the ſame Page, and in that very Direction which you lay all your Streſs upon, you have theſe Words, *viz. You may deſcribe your intermediate Rhumb, by firſt drawing a RHUMB* (mind theſe Words in Capitals, Sir,) *PARALLEL to the Given RHUMB, &c.* Now this, (tho' it farther, if poſſible, confirms what I have before been demonſtrating) ſeems to me to reliſh pretty ſtrongly of *Incoherency*, Sir, does it not?

In *Page* 16, You tell me I verify the old Proverb, *viz.* that there is none ſo blind as thoſe that will not ſee: What would you have me ſee, Sir, that which is not? You bid me indeed allow proportionally, but to what, Sir? Surely, if I muſt allow proportionally, it muſt be to ſomething, there muſt be ſome given Ratio, but you have ſet down no ſuch Ratio in your Original Directions; how then ſhould I ſee it? You ſeem here to act the Part of *Pool*, in one of *Eraſmus*'s

Colloquy's, call'd, *The Exorciſm*, who would fain perſuade his Companions that he ſaw a ſwinging great Dragon in the Air, when there was no ſuch thing. *Pool* indeed was a waggiſh Spark, and knew well enough that he jeſted all the while; but you ſeem to be in earneſt. A little farther, you repreſent the *Globular-Chart* as natural to the Eye; pray, where do you fix your Point of Sight?

In *Page* 18, near the Top, you tell me I have made uſe of a little *Wapping* Rhetorick; but why muſt it be *Wapping* Rhetorick, Sir? Don't you believe that we have Men in *Wapping* of as good Senſe and as good Manners as any in the *Little-Minories*, or near *Fleet-Ditch*? Why do you caſt an Odium on the whole Body for the Sake of doing it to an Individual? You forget ſurely, Sir, that you have ſeveral Relations in theſe Parts that are Men of Worth, pray how do you think they will take this pretty Compliment. You tell the World indeed, *Page* 10, that your chief Deſign is to juſtify the Excellency and Uſefulneſs of the *Globular-Chart*; but it ſeems to me as if your chief Deſign is to *Blacken*, elſe why do you throw ſuch a prodigious Quantity of Dirt.

In the ſame *Page*, you tell me, that the Queſtion wherein one Latitude Diſtance in a Rhumb and Difference of Longitude are given to find the other Latitude, *&c.* may be ſolved by the *Globular-Chart*, but ſay at the ſame time that this Solution will not agree with the Calculation; pray, Sir, does this Solution then ſavour any thing of what is called *Mathematical Demonſtration*?

In *Page* 19, You tell me if I look into Mr. *Colſon's* Kalendar I ſhall find two impractical Caſes. I don't follow Mr. *Colſon*, I follow Mr. *Wright*, Sir, who does not make Departure a Datum in his Sailing, as you may ſee *Page* 66 of his *Correction of Errors*.

In *Page* 19, You tell me you will *come a little cloſer to the Matter*, *viz.* about Departure, and then you ſay, *If a falſe Departure bring out a true Longitude, what will a true Departure do, if that bring out a true Longitude too, then true and falſe are all one*, ſay you; very ſmart, I profeſs, Sir, but I ſuppoſe you will have it that a true Departure will bring out a true Longitude; and you ſay a little farther that a falſe Departure will bring out a true Longitude; it appears then by your own Argument that true and falſe are the ſame; ſo that if what I have ſaid be abſurd, *NB.* You have trod in my Steps; to what purpoſe then have you made all this Buſtle.

In *Page* 20, You ſay I have quite drop'd Departure out of my Data in conſtructing the *Mercator's-Chart*; pray when did I or any one elſe ever make any Uſe of it for that Purpoſe? This looks as if you did not know how to conſtruct a *Mercator's-Chart*, don't it, Sir.

Page 21, You ſay the *Globular-Chart* reconciles all the ſeeming Difficulties and Differences about Departure, how can this be when it has no Lines in it expreſſing the ſhorter Perpendicular in a *Mercator's* Queſtion?

In *Page* 22, you tell us, that a Great Circle is repreſented on the *Globular-Chart* in ſo ſimple a Form as a Right-Line; if ſo, pray how comes it to paſs that your Meridians are not Right-Lines? In plain Terms, Sir, you have here told the Publick a downright Falſhood, and what does this ſhew? Why, it ſhews, either that you do not underſtand the Nature of the *Globular-Projection*, or elſe your Intention to impoſe upon the induſtrious Mariner. Or laſtly, Is a certain Demonſtration of a *Brazen Head*. 'Tis pitty, Sir, That you were not better known in the late Bubbling Times; if you had, no doubt but ſome of thoſe Gentlemen would have raiſed a Subſcription upon your *Cranium*, ſince from ſuch a large Quantity of pure Braſs on the Surface, they could do no leſs than infer, that the Oar within muſt be very Rich and Copious.

If then the Arch of a great Circle is not repreſented on the *Globular-Chart* by a Right-Line (as you will find in all Caſes, but on the Middle Meridian; if you will be at the Pains of calculating the Latitudes and Longitudes by which the Arch of a Great Circle between any two Places paſſes, and comparing with the Right-Line drawn from Place to Place on the Chart, as I have done in ſeveral Inſtances) I can't beat it into my Head which way the *Globular-Chart* can be of any Uſe in ſailing by the Arch of a Great Circle: Nay, if the Arch was repreſented by a Right Line, I can't even then ſee why it ſhould be called an Improvement, becauſe we had, before this, a Method of repreſenting the Arch of a Great Circle by a Right Line; Witneſs, the *Gnomonick Projection*.

In ſeveral Places of your Piece, you build very much upon Approximation, telling us, that you have done the *Globular Chart* ſo true, that it will bear meaſuring, *Page* 7. That the Error in Meaſuring is inconſiderable, *Page* 22, And *Page* 23. the Error is inſenſible, And in *Page* 24, you repreſent me as villifying the Induſtry of the Lord *Napier*, Mr. *Briggs*, Mr. *Gunter*, &c. with relation to the Logarathims: But if you pleaſe to conſider, you will find that the Approximations, which you all along compare yours with, are Arithmetical ones, where we may arrive to what Degree of Exactneſs we pleaſe; but yours is Inſtrumental, and not capable of that Exactneſs. For Inſtance, Suppoſe you attempted to approximate the Diſtance on the Curve BG, in your Chart; to this end, you know, you ought to take as ſmall a Diſtance off your Scale as 'tis poſſible to do with a Pair of Compaſſes, for if this Diſtance be large, then the Sum of the Chords will ſenſibly differ from the Curve; let this Diſtance be five Leagues. Now if you err ever ſo little in takeing off theſe five Leagues, which 'tis almoſt impoſſible to avoid, this Error will be multiplied according to the Number of Turns, and will in the end amount to a very conſiderable one; and if you take off but one League or Part of a League, as there will then be a greater Number of Turns, ſo the Error will be more conſiderable. Hence ariſes a ſort of Paradox relating to the *Globular-Chart*, *viz.* the nearer you attempt to approximate the Truth, the farther you are from it, and this diſcovers your great Skill in the *Mathematicks*, *viz.* in comparing Inſtrumental Approximations with Arithmetical ones; however, I ſuppoſe you call this by the Name of *Mathematical Demonſtration*, do you not, Sir? Hence alſo we may diſcover, that how true ſoever a *Globular-Chart* may be in Theory, yet it will be very difficult upon this Account to conſtruct one that ſhall be true in Practice; nay, if all imaginable Care ſhould be taken in this Reſpect, yet it can never be proved to be a true Conſtruction till it can be demonſtrated, that a Number of Chords (not infinitely ſmall ones neither, but ſuch as muſt be taken in a Pair of Compaſſes) are equal to the Sum of the Arches of which they are the Chords.

In the ſame *Page*, you have laid an Obligation upon me, in telling the World that thoſe Qualifications which I recommended do Center in myſelf; I thank you, Sir, but pray compare this with *Page* 20, *Line* 6 from the Bottom, ſee how they Cohere, and then think once more upon the Fable of the Satyr and the Traveller.

In *Page* 25, you aſk me ſeveral pretty Queſtions; I hope the World will excuſe me, if I propoſe to you, by Way of Return, ſome of a like Nature.

Firſt then, What might be the Reaſon that induced you, after you had ſtood the Engagement with the *Spaniſh* Fleet in the *Mediterranean*, to leave your Ship before the Voyage was done? Be ingenuous, Sir, Was it for Fear of meeting with another Bruſh or not?

In the next Place, why do you value yourſelf ſo much upon your writing a Number of Books? If this be a juſt way of Reaſoning, then the greateſt Men of this Age are certainly to be found in the *Garrets of Grub-ſtreet*, and by what I gather from *Page* 25 of your *Book*, at the Bottom, I don't doubt but you would fill one of thoſe Manſions very commendably, becauſe very frequently on a *Saturday-Evening* we have ſomething from that Quarter, relating to Apparitions, Dragons in the Air, *&c. enough to frighten People out of their Senſes*, you know; but becauſe you talk ſomething of a *Cloak* in that Place, give me leave to tell you a Story, *viz.* The firſt time I happened to be in your Converſation, you told me, That you had found out the Cauſe of the Ebbing and Flowing of the Tides, and given an Account of it in your Book of Navigation; I preſently found that you had aſſumed to yourſelf a Diſcovery that was owing to the greateſt Philoſopher and Mathematician the World ever produced, upon which I immediately pointed out to you, the Man, ſhall I ſay? Surely, ſomething more than Man. upon this, you anſwer'd, That though he had hit upon it firſt, yet you had hit upon it too; which, ſaid you, was a farther Confirmation of the Truth of the Thing. (*O Wonderful!* or Ridiculous, ſhall I ſay.) Here, Sir, You may perceive that you endeavoured to hide the firſt Diſcoverer by a *Cloak*: And if any body ſhould aſk me, What ſort of Stuff this *Cloak* was made of, I ſhould judge it to be made of a Piece of as *ſuperlatively* good *Inſolence* as any in the World: This Cloak, it lay in my Power to *take off*, which as ſoon as I had done, I diſcovered ſomething that I muſt confeſs was very ſurprizing, tho' it did not *frighten me quite out of my Senſes*, for it was the *Great* AUTHOR OF THE GLOBULAR CHART Metamorphos'd into a RAREE-SHOW MAN. Don't you remember this Story, Sir, it was about ſix or ſeven Years ago, and the Place next Door to where I then lived; and I can produce one of the Company, a Maſter of a Ship, to vouch the Truth of it. You may remember alſo, at the ſame Time and Place you ſhewed me a Copy of Verſes, which you told me were of your own Compoſing, and which you deſigned to put before an *Almanack* you had then in hand, and deſigned to publiſh under the Title of *Calendarium Catholicum*. In theſe Verſes you had brought in *Homer*, *Horace*, *Virgil*, *&c.* I concluded therefore that you were intimately acquainted with thoſe great Authors; but believing by ſome Circumſtances of your After-Diſcourſe, that I was miſtaken, I took the Courage to ask you what Gender *Calendarium* was of: You reply'd, That you generally had Recourſe to your *Dictionary* for ſuch Things; ſo that notwithſtanding the Freedom you had made with the above-named Authors, it ſeems you had forgot *Omne quod exit in* um.

Learned Readers, you ſee what Sort of Uſage I have met with from Mr. Wilſon *in* Page 24, 25, 26, *and in many other Places of his* Book; *therefore hope your Pardon for theſe, and ſome other Paſſages of Like Nature; for* I *am perſuaded that you know very well, that there are ſome who might take my Adverſary to have the Advantage of the Argument, if I did not repay him in his own Coin. I hope, Mr.* Wilſon, *you will excuſe this Digreſſion.*

Thirdly, Why have you not anſwer'd my laſt Letter of the private Controverſy between us about the *Globular-Chart*, which you know was long before this publick one began. You may remember that Mr. *Harris*, your Partner, engaged for you at the *Sieve* near twelve Months ago that you ſhould; but you have not yet made good your Friend's Engagement. In ſhort, Sir, I have made you *Quiet* twice already upon this Subject of the *Globular-Chart*, *viz.* Once in a Converſation at S. *Katharine*'s, when Mr. *Bowen* the Graver was preſent, and you run away, you know; another Time by Private Letters that paſs'd between us, for you never anſwer'd my laſt: Beware of the third Time, Sir, notwithſtanding you have the Aſſiſtance of a Great Man, for all the World muſt allow my Cauſe to be good; and I hope, tho' I am an *Obſcure Schoolmaſter* as you are pleaſed to term me, and live in *Wappin*, that that little Senſe, and that ſmall Share of *Mathematicks* I am Maſter of, will enable me to defend it againſt any Oppoſer.

Fourthly, Why have you, in your *Book* of *Arithmetick*, given us a defective Rule in ſo eaſy a Piece of Mathematical Knowledge as is *Multiplication of Decimals*? Be Ingenuous again, Sir, was it for want of Knowledge, or not?

Fifthly, Why do you call your *Book* of *Trigonometry*, *Trigonometry Improved*, when you have left out the Demonſtrative Part, and have added nothing New? This looks as if you had not read much upon that Subject, Sir.

Laſtly, Why have you given us a deceitful Rule in your *New Directions for the Uſe of the Globular-Chart*, and in ſo eaſy an Inſtance as is finding the Latitude of a Place? This you may ſee in *Page* 28 at the Bottom, where you have theſe Words, *viz. BUT if, as it commonly happens, the Place propoſed lie between two deſcribed Parallels, as ſuppoſe* Cape Finiſter, *and I would know its Latitude, ſet one Foot of your Compaſſes in the next Parallel whether above or below, it matters not, and extend the other to*

Cape Finiſter; *with that Extent and one Foot in the ſame Parallel, where it Croſſes the graduated Meridian, extending the other the ſame way as you did, the movable Point will fall upon the Latitude: Thus* Cape Finiſter *will be found to be in Latitude 43 Degrees 6 Minutes.*

Here you leave the Mariner at Liberty to ſet one Foot of his Compaſſes *any where* in that Parallel; at this Rate *Cape Finiſter* may be made to lie in any Latitude. For Inſtance, Suppoſe the Mariner ſhould ſet the Foot of his Compaſſes in the Parallel above that Cape at *r*, then it would be found in Latitude 42 Degrees 40 Minutes: If he ſets the Foot of his Compaſſes in the ſame Parallel, and where the next Meridian to the Weſtward cuts it, then the Cape will be found in Latitude 41 Degrees and about 5 Minutes: If he ſhould ſet the Foot of his Compaſſes at *a*, and work by the Rule, then it would be found in Latitude 30 Degrees and about 45 Minutes: If on the Weſtermoſt *a*, then it would be found in Latitude 19 Degrees and about 10 Minutes; whereas it lies in 43 Degrees and about 5 Minutes: Here's Glorious Work performed by your Rule, Sir! And now for another

COROLLARY.

Hence the Globular-Chart, *uſed according to Mr.* Wilſon's *New Directions*, will deceive the *Mariner* above *Twenty* in *Forty*: Theſe are ſome Inſtances of your great Skill in *Mathematical Demonſtration*, Sir.

Pray, Sir, the next time you undertake to teach People how to draw a Line Parallel to a Line given, which ſhall paſs thro' a given Point; that you direct them to ſet the Foot of their Compaſſes in the given Point firſt, and not firſt in the given Line.

In the ſame Page, you tell me, That what is contained in my *Appendix* has been known to almoſt every School-Boy this Hundred Years; I ſhould have been obliged to you if you had made your Aſſertion good; but ſince you have not, it may not be amiſs to reflect a little upon the Word *Front*, you know.

In *Page* 26, after a little *Wilſonian* Rhetorick, you tell me that notwithſtanding I condemn Curve-lin'd Projections, I fall on directly to give a Deſcription of a Curve-lin'd Scale; but, Sir, tho' there are Curve-Lines in this Scale, yet theſe are not the Lines by which the *Mercator's-Chart* is to be meaſur'd, but the Right-Lines; and by theſe Right-Lines any Diſtance on a Given-Rhumb on that Chart may be meaſured as truly as any other thing can by any other Scale, therefore this Scale is not like the *Globular-Chart*, in which the Diſtances are meaſured on the Curve Lines.

In *Page* 37, you ſay the Squares, contained between any two Parallels and two Meridians, ſhould be equal; but if you'll pleaſe to *meet me at any Place and Time, and before any Perſon*, I will ſhew you that the Diagonals are in your Chart unequal, and therefore your *Globular-Chart* is falſe: This is by Way of Return, Sir, for finding Fault with the Chart in my Book, when you could not prove but the Method whereby it was drawn is the ſame by which yours was drawn.

In your laſt *Page*, you are pleaſed to make mention of two Perſons engaged in a *Mathematical Controverſy*, and you ſay let them but alone, and like the Seditious *Jews* in *Jeruſalem*, they will deſtroy one another: This being your finiſhing Stroak, I ſuppoſe you endeavoured, in Imitation of the Poets, that it ſhould be the moſt Maſterly; but you have miſtaken your Point again, Sir, and have given the World an undeniable Proof of your profound Skill in *Mathematical Demonſtration* in drawing this Parallel, for if you will pleaſe to conſider, you may probably ſee, that the Evidence of the *Mathematical Sciences* is ſuch, that it will admit but of the Overthrow or Deſtruction of one of the Parties engaged. How does this *Cohere*, Sir.

By the Peruſal of what goes before, you may perceive that I have aimed at little more than a Juſtification of what I before aſſerted; and the Reaſon is, becauſe I deſigned it as a *Publick Reply*, ſince you gave me that Liberty, to your Challenge in *Page* 40, for I look upon this as a much better way than to do it obſcurely and before a *Single Mathematician* only. It would have been no very difficult Matter to have gone farther, and to have ſhewn HOW MUCH the Error of the *Globular Chart* is in every Caſe propoſed, and I could eaſily prove it falſe, as you propoſe it to the World, above *Twenty* in *Forty*, from another Principle than your Original Directions; but this I reſerve for another Opportunity.

But to draw towards a Concluſion: When you firſt offer'd the *Globular Chart* to the World, the firſt Step you took was to *Blacken* the *Mercator's Projection*, by ſaying it was *Puzzling*, *Difficult*, *Abſurd*, *Deficient*, and what not; all which Expreſſions, I have proved to be mere *Bluſter and Noiſe*. Then in the ſame bluſtering manner you applauded that (as you term it) New, True, Natural, Eaſy, and Practical Thing called the *Globular-Chart*, and gave Directions for its Uſe; I have prov'd if this *Globular-Chart* be uſed according to thoſe Original Directions, that it will lead the Mariner out of his Way 20 Degrees in 40. You Conſcious no doubt of the Truth of what I ſaid, have run away from thoſe firſt Directions, and have framed a Sett entirely New, more agreeable to Truth indeed in ſome Caſes; but vaſtly more Puzzling, Difficult, and Uncertain than what relates to the *Mercator's-Chart*. What remains then, is to ſhew univerſally which of the two Charts is moſt Expeditious, True, and Eaſie in Practice; but becauſe this can't be ſo well and ſo effectually performed by SAYING, as it can by DOING, I am very willing to ſubmit the Deciſion of this Controverſy to an *Experiment*, to be made before the ROYAL SOCIETY, before which Learned and Impartial Body we ſhall ſoon put an End to it, if we purſue the following fair Method, *viz.* Let us bring with us clean Paper, and proper Inſtruments and Tables for our Purpoſe, then do you conſtruct a *Globular-Chart* from the Latitude of *Cape Bona Eſperance*, which for the ſake of a Round Number, we will ſuppoſe 34 Degrees South, to Latitude of the *North Cape*, which lies in the Way to *Arch-Angel*; which for the ſame Reaſon, we will ſuppoſe in Latitude 72 Degrees North, and from Longitude 00° 00′ to Longitude 120° 00′ *Weſt*, and deſcribe the thirty two Rhumbs from many Centers as you pleaſe, I will make a *Mercator's-Chart* for the ſame Latitudes and Longitudes, *&c.*

The Charts being conſtructed, let us proceed to Practice, and I think we cannot do better, or fairer, than to propoſe for Solution the very *Problems* which the famous Mr. *Wright* himſelf has ſet down in *Page* 66, 67, and 68 of his *Book of the Correction of Erros*, which take as they ſtand in his own Words in the Margins of the ſaid Pages, *viz.*

PROB. I.

By the Longitudes and Latitudes of two Places, to find the Rhumb and Diſtance.

PROB. II.

By the Diſtance and Latitudes, to find the Rhumb and Longitude.

PROB. III.

By the Rumb and Latitudes, to find the Diſtance and Difference of Longitude.

PROB. IV.

By the Longitudes, Rhumb, and one Latitude, to find the other Latitude and the Diſtance.

PROB. V.

By the Rhumb, the Diſtance, and one Latitude, to find the other Latitude and the Difference of Longitude.

Theſe are the *Problems*, Sir, which the Immortal Mr. *Wright* thought neceſſary and ſufficient to ſhew the Uſe of his Chart: Now let us exemplify them.

Examples of Prob. I.

Suppoſe a Ship is to ſail from a Place in Latitude $\frac{1}{2}$ _____, and Longitude $\frac{1}{2}$ _____, bound to another Place in Latitude $\frac{2}{1}$ _____, and Longitude $\frac{1}{2}$ _____, required, what Courſe will direct the ſaid Ship from the Place ſhe ſails from, to the Place ſhe is bound to, and the Diſtance, in the Rhumb, between the two Places?

Examples of Prob. II.

A Ship ſails from a Place in Latitude $\frac{1}{2}$ _____, and Longitude $\frac{1}{2}$ _____, between the $\frac{1}{2}$ _____ and $\frac{1}{2}$ _____, till her Diſtance on the Rhumb be $\frac{1}{2}$ _____ Leagues, and then obſerves herſelf in Latitude $\frac{1}{2}$ _____, required what Courſe ſhe ſteered, and what Longitude ſhe is in?

Examples of Prob. III.

Suppoſe a Ship ſails from a Place in Latitude $\frac{1}{2}$ _____, and Longitude $\frac{1}{2}$ _____, upon the $\frac{1}{2}$ _____ Rhumb, till ſhe obſerves herſelf in Latitude $\frac{1}{2}$ _____, required, what Longitude the Ship is now in, and what Diſtance ſhe ſailed on the Given Rhumb?

Examples of Prob. IV.

A Ship ſails from a Place in Latitude $\frac{1}{2}$, _____ and Longitude $\frac{1}{2}$ _____, upon the $\frac{1}{2}$ _____ Rhumb, till ſhe comes into the Longitude $\frac{1}{2}$ _____, required, what Latitude the Ship is in, and how far ſhe ſailed upon the Given Rhumb?

Examples of Prob. V.

Suppoſe a Ship ſails from a Place in Latitude $\frac{1}{2}$ _____, and Longitude $\frac{1}{2}$ _____, upon the $\frac{1}{2}$ _____ Rhumb, till her Diſtances on that Rhumb be $\frac{1}{2}$ _____ Leag, required, what Latitude and Longitude the Ship is in.

Theſe *Examples* are thus to be underſtood, *viz.* the Places of the two Lines N° 1. 2. which are drawn after the Words *Latitude*, *Longitude*, *&c.* when you propoſe theſe Examples to me, you may ſupply with what Numbers, &c. you pleaſe, provided they do not exceed the Limits of the Chart propoſed; and when I propoſe them to you, I will ſupply the Places of the ſaid Lines with what Numbers, &c. I pleaſe with the aboveſaid Reſtriction; by this means we ſhall each have two Examples of each Problem; for when you read the Words of the Example the firſt time over, if you read the Number, or Name of the Rumb, which is to ſupply the Place of the Line N° 1. this will make one Example; and if you read the ſame Words a ſecond time, and read the Figures, or Name of the Rhumb which is to ſupply the Place of the Line N° 2 this will be a ſecond Example of the ſame Problem; and there will be this Advantage in this Method, *viz.* that as neither of us can know the Quantity of the Data of theſe Examples till the Experiment comes to be put in Practice, ſo all Clandeſtine Management before-hand will thereby be prevented.

Tho' the Solution of theſe Examples on two different Charts are ſufficient to ſhew the Advantages one has above the other in common and ordinary Practice, yet there is one Caſe which has more than once happen'd, that will require ſomething farther, *viz.* Sir *Francis Drake*, you know, ſailed round the World, as did Sir *Thomas Cavendiſh*, and ſome Ships of late from *Briſtol*; we find the Tracts of the Ocean which the two firſt ſailed over, delineated on the Globe; and this I take to be a very uſeful thing, not only in Voyages round the World, but alſo for thoſe particular Voyages where ſome certain Circumſtances renders a direct Courſe Impracticable. For Inſtance, becauſe the way which all experienced Commanders take to the *Eaſt-Indies* is nearly the ſame, it might not be amiſs to deſcribe, from ſome one of their Journals, on our Common Charts, Lines repreſenting this Tract; for by this means thoſe who have not ſo great Experience, or who have never been that Voyage before, may be directed in the Way they ought to purſue.

To this end, you know it will be neceſſary actually to deſcribe what we call a Traverſe on Charts, or ſuch Lines as ſhall ſhew the Courſe and Diſtance which a Ship makes good every Day. To the former Examples then we will add one Traverſe to be actually deſcribed on the Charts; which let be as follows:

An Example of a Traverſe.

Suppoſe a Ship ſails from a Place in Latitude ———, and Longitude ——— upon a ——— Rhumb ——— Leagues, then altering her Courſe, ſails upon a ——— Rhumb ——— Leagues, then altering her Courſe a third time, ſhe ſails upon a ——— Rhumb ——— Leagues, then ſhe ſails on a ——— Rhumb ——— Leagues; and then altering her Courſe a fifth time, ſhe ſails upon a ——— Rhumb ——— Leagues: And laſtly, altering her Courſe again, ſhe ſails on a —— Rhumb —— Leagues. Required an actual Deſcription of the Rhumb Lines of this Traverſe on the Chart, and, which will ſerve to prove the Truth of the other, of the Rhumb of the Bearing of the Place the Ship ſailed from.

NB. *The Rhumbs and the Diſtances on each Rhumb, inſtead of which I have drawn Lines, are to be ſupply'd by us as we pleaſe, when we come to try the Experiment, provided they don't exceed the Limits of the Chart.*

Now, Sir, If you can conſtruct a *Globular-Chart* for the aforeſaid Latitudes and Longitudes, and upon or by it only, reſolve thoſe Ten Examples and the Traverſe, as I ſhall fill them up at the Time of the Experiment, ſooner and truer than I can conſtruct a *Mercator's Chart* for the ſame Latitudes and Longitudes, and upon or by it only, reſolve all thoſe Ten Examples and the Traverſe as you ſhall fill them up at the ſame time; then I will give up the Cauſe of *Mercator* for ever; but if you cannot, then the World muſt allow that what I have ſaid for *Mercator's Chart* is juſt, and that I have been acted by a Principle of Publick Good only.

This Experiment, Sir, will ſhew the ſuperior Excellency of one of the Charts in all Points, *viz.* as well with reſpect to *Truth* as *Expedition*, and therefore I expect, nay I requeſt of you to put it in Practice as ſoon as poſſible; Dr. *Halley* will, at your Deſire, no doubt, let us know when it will be a proper Time to lay it before the *Royal Society*, as being himſelf one of that Illuſtrious Body; and I am perſuaded that we ſhall not be refuſed an Admittance becauſe 'tis not about a trifling Matter, but an Affair that highly concerns the Publick Good: Therefore if you will pleaſe to give me but a Weeks Notice by a Publick *Advertiſement* and a Private *Letter*, if Life and Health permit I will certainly meet you.

But if you do not think fit to ſtand to this fair Propoſal, (Challenge you may call it if you pleaſe) you need not give yourſelf any farther Trouble in Writing, or put your Friends to any farther Charge in Printing any more Books about this Matter, for I ſhall not Anſwer them; becauſe by your Refuſal of ſo fair an *Offer*, the impartial World will no doubt be fully convinced that you are the Perſon whoſe Arguments are juſtly chargeable with that *Falſity*, *Invalidity*, and *Incoherency* with which you unjuſtly charge thoſe of your Humble Servant

Thomas Haſelden.

POSTSCRIPT.

If you will not fail to meet me before the ROYAL-SOCIETY *and try the foregoing propoſed Experiment, I here promiſe, that then I will there prove, That the* Globular Projection *will deceive the Mariner* more *than* 20 *in* 40, *and muſt neceſſarily do ſo (if it be meaſured by one and the ſame Scale of Equal Parts, which is according to your* Propoſals) *from the Nature of its Conſtruction, and that too in as many Inſtances or Caſes as it will deceive him* leſs *than* Twenty *in* Forty; *which I do aſſure you, Sir, and which I alſo undertake there to prove, are very many. But, if you do fail, then I hope what I have ſaid may be taken for a complete Vindication of that moſt excellent Invention, commonly called,* The Mercator's-Chart, *from the Aſperſions of Mr.* Wilſon, *and a Demonſtration of the Inſufficiency of that ridiculous Thing which he* Inconſiſtently *calls a* Globular-Chart.

FINIS.

16 AP 68